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The Resources Agency

DEPARTMENT OF WATER RESOURCES
Division of Operations and Maintenance

STATE WATER PROJECT ANNUAL REPORT OF OPERATIONS 1992

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Table Of Contents

Tables

Figures

Maps

Appendix: Summary of Aqueduct Operations

Glossary

Abbreviations and Units

The following abbreviations, commonly used throughout this report, are defined here.

AF	acre-feet
Banks	Harvey O. Banks Delta Pumping Plant
California Aqueduct	Governor Edmund G. Brown California Aqueduct
CVP	Central Valley Project
cfs	cubic feet per second
D-1485	Water Rights Decision 1485
DOI	Delta Outflow Index
DWR	Department of Water Resources
DO	dissolved oxygen
EC	electrical conductivity
ft	feet
Kv	kilovolt
KW	kilowatt
KWh	kilowatt-hour
LADWP	Los Angeles Department of Water and Power
MAF	million acre-feet
MW	megawatt
MWh	megawatt-hour
MWDSC	Metropolitan Water District of Southern California
PG&E	Pacific Gas and Electric Company
SCE	Southern California Edison
SDWA	South Delta Water Agency
SRI	Sacramento River Index
SWP	State Water Project
SWRCB	State Water Resources Control Board
USBR	United States Bureau of Reclamation

Introduction

The 1992 Annual Report of Operations for the State Water Project is divided into seven parts. The first two parts, "Highlights of 1992 Operation" and "Project Status in 1992," cover conditions and events of statewide significance. The following three sections cover water conditions, water operations, and energy operations in 1992. The sixth part, "Sacramento-San Joaquin Delta Operations," gives special emphasis to Delta operations, a key aspect of the SWP. The last part, "Project Operations by Field Division," provides further detail on operational conditions and activities by field division as outlined on Map 2.

The report also includes an appendix, covering the operations of the California Aqueduct in 1992.

Highlights of 1992 Operation

During the last six years, 1987 through 1992, Californians have experienced one of the State's driest hydrologic periods. Thanks to water delivery systems now in place, the economic effects of this six-year drought have been mitigated. Costs of the drought have been high: agricultural land has been fallowed; hydroelectric energy production has declined; groundwater levels have been depleted; winter-run Chinook salmon and striped bass populations declined significantly; agricultural unemployment rates have risen considerably; and local businesses primarily dependent on agriculture for sales have suffered.

Managing available water supplies during the drought required activities designed to make the most beneficial use of water available to SWP. DWR initially structured its plans for water conservation, storage, and delivery capabilities according to the concept of a firm yield. Firm yield is the quantity of water that can be made available on a firm annual basis to municipal and industrial users, and to agricultural users during a drought period. Because of escalating costs of building large-scale water projects, all facilities necessary to manage water this way have not been built.

Operating on the basis of a variable yield makes efficient use of available water supplies during a drought. Delivery capabilities are frequently reevaluated and modified as water supplies, hydrologic conditions, reservoir storage levels, and amounts of water needed for environmental protections change. By changing the basis of operations from a firm yield to a variable yield, DWR also changed its activities for water management and developed programs to compensate for the lack of storage facilities. These programs include transferring, exchanging, loaning, storing, purchasing, and carrying over water for delivery at a later date. Total requests for delivery of entitlement water in 1992 were about 4.01 MAF. The initial allocation in December 1991 provided for 20 percent of requests for municipal, industrial, and agricultural uses. However, because of spring storms, the Department approved increases in entitlement deliveries to 35 percent in early March and to 45 percent in late March.

DWR negotiated the transfer of 102,318 AF of water in 1992. This included one transfer of SWP entitlement water, three transfers of water purchased from the 1991 Drought Water Bank, and four transfers of water purchased from the 1992 Drought Water Bank.

Programs permitting agencies to exchange, loan, store, and purchase water from the SWP allowed contractors to pump water directly into the California Aqueduct. To preserve water quality, DWR normally does not allow water to be pumped directly into the aqueduct. But because of the severity of the drought, DWR approved the pump-ins after establishing a comprehensive program to monitor the quality of water introduced into the aqueduct. Pump-in agreement details are discussed further in this report under *"Water Deliveries and Aqueduct Operations"*.

In 1991, seven long-term contractors carried over 92,282 AF of entitlement water that DWR delivered in 1992.

DWR and USBR declared balanced Delta water conditions three times during 1992: from January 1 to January 9, from January 14 through February 15, and from May 1 through December 31. This was the ninth consecutive year in which balanced water conditions were declared. Balanced water conditions exist when upstream reservoir storage releases, plus other inflows, approximately equal the water supply needed to (1) satisfy Sacramento Valley and the Sacramento-San Joaquin Delta in-basin needs, including Delta water quality requirements, and (2) meet export needs. During balanced water conditions, DWR and USBR adjust their reservoir storage releases and Delta exports to enable each agency to meet its share of in-basin uses and Delta outflow.

There are 19 plants along the SWP with pumping capabilities. These include 2 State-federal facilities, 1 federal facility, and 16 State facilities. Plants used for federal pumping are Banks, O'Neill, Gianelli, and Dos Amigos. A detailed list of all project pumping is shown on Table 1.

Energy resources totaled 7,332,072 MWh which includes generation of 3,795,546 MWh of energy at SWP locations, purchases of 765,449 MWh, other resources of 171,682 MWh, and 2,599,395 MWh of SCE return additional (see Figure 4). Energy loads of 7,332,072 MWh include sales of 2,467,108 MWh, 4,648,051 MWh used to deliver water to SWP contractors, 214,211 MWh of losses, and 2,702 MWh of actual deviation (see Figure 6).

SWP facilities delivered 2,704,868 AF of water to forty-two agencies in 1992 as shown on Table 2. This amount is approximately 358 TAF more than the total State and federal water deliveries from the SWP in 1991. State contractor deliveries were 1,512,997 AF; including 1,389,078 AF of entitlement water and 123,919 AF of other water; excluding Joint Facilities and prior water right deliveries. See the *"Water Deliveries and Aqueduct Operations"* section for more details on water deliveries.

Project Status in 1992

Project Facilities

The SWP conserves water for distribution to much of California's population and to irrigated agriculture. It also provides flood control, water quality control, electrical power generation, recreational opportunities, and enhancement of sport fisheries and wildlife habitat.

SWP facilities in operation during 1992 (Map1) included: 22 water storage facilities with a gross capacity of 6,768,792 AF, 7 power plants with a total output capacity of 1,686 MW; 16 pumping plants housing 112 units with a total motor rating of 2,768 MW; and 537 miles of aqueduct. A detailed description of aqueduct flow follows.

The SWP begins with three small lakes on Feather River tributaries (Lake Davis, Frenchman Lake, and Antelope Lake). The branches and forks of the Feather River flow into Lake Oroville, SWP's principal reservoir with a capacity of about 3.5 MAF. From Oroville, water flows through three hydroelectric powerplants, then down the Feather River into the Sacramento River before reaching the Delta. From the northern Delta, water is supplied to Napa and Solano counties through the North Bay Aqueduct.

Water is supplied to Alameda and Santa Clara counties through the South Bay Aqueduct. Banks Pumping Plant lifts water into Bethany Reservoir. The South Bay Pumping Plant then lifts the water into the South Bay Aqueduct. Most of the water from the Bethany Reservoir, however, flows into the Governor Edmund G. Brown California Aqueduct. At O'Neill Forebay, part of the water is pumped through the William R. Gianelli Pumping-Generating Plant for storage in San Luis Reservoir until needed. DWR's share of storage in the reservoir is 1,062,000 AF of water.

Water not stored in San Luis Reservoir continues its flow south down the valley and is raised 1,069 ft by four pumping plants; Dos Amigos, Buena Vista, Teerink, and Chrisman. In the southern San Joaquin Valley, the Coastal Branch Aqueduct serves the agricultural areas west of the California Aqueduct. At the Tehachapi Mountains, Edmonston Pumping Plant raises the water 1,926 ft and the water enters 8.5 miles of tunnels and siphons. Once the water has crossed the Tehachapi Mountains, it flows through the California Aqueduct into the Antelope Valley.

The California Aqueduct then divides into two branches, the East Branch and West Branch. The East Branch carries water through the Antelope Valley into Silverwood Lake. From Silverwood Lake, the water enters the San Bernardino Tunnel and drops 1,418 ft into Devil Canyon Powerplant, then flows to Lake Perris, SWP's southernmost reservoir.

Water in the West Branch flows through the Warne Powerplant into Pyramid Lake. From Pyramid Lake the water flows through the Angeles Tunnel and Castaic Powerplant into Castaic Lake, terminus of the West Branch. For the location of facilities cited here, see Map 3.

SWP facilities include 22 dams and reservoirs. Lake Oroville and San Luis Reservoir are the primary conservation facilities. The remaining 20 dams and reservoirs are used principally to regulate the conserved supply into water delivery patterns designed to fit local needs. Of those 20, the five largest are Lake Del Valle, located in Alameda County; and Pyramid Lake, Castaic Lake, Silverwood Lake, and Lake Perris, in southern California. Lake Del Valle is located approximately four miles from the city of Livermore. The four southern reservoirs are located near the metropolitan areas of southern California, where water supplies are mainly imported. Information about those reservoirs, including amounts of unimpaired runoff to Lake Oroville and storage levels for SWP's conservation, and other storage facilities are summarized in this report.

In 1992, DWR was involved in planning one additional surface reservoir, Los Banos Grandes, and developing a significant groundwater storage program, Kern Water Bank. Los Banos Grandes, authorized by the California Legislature in 1984, is designed to be the primary south-of-the-Delta water storage facility for DWR. To be effective, Los Banos Grandes must be linked with an efficient Delta transfer facility. The facilities (consisting of a dam, an offstream storage reservoir, several saddle dams, and two pumping-generating plants) will be located in Merced County on Los Banos Creek. The project includes a pumping-generating system for filling the reservoir from the California Aqueduct and for recovering energy when releases are made.

The Kern Water Bank, a subsurface reservoir, is designed to store SWP water in the ground during wet years. Later, during dry periods, water can be withdrawn by pumping to the California Aqueduct or substituted for entitlement water that ordinarily would be delivered to Kern County. The water bank currently consists of eight separate projects or elements. The initial element, the Kern Fan Element, was proposed by DWR. To build the Kern Fan Element, DWR plans to construct recharge basins and extrac-

tion wells, and use similar facilities that have been constructed as part of the La Hacienda Groundwater Program. DWR signed a contract for purchasing recharged groundwater from La Hacienda, Inc., in 1990. To extract the water, DWR rehabilitated existing wells and built conveyance facilities.

Outages and Limitations

Major outages, construction, and operating limitations of SWP facilities during 1992 were:

January

- Hyatt Number 1 intake, penstock, and units 1, 2, and 3 were unavailable to replace turbine shutoff valves upstream seat "O" ring seals.
- Edmonston east discharge line continued to be out of service for replacement of discharge valve seats. This outage began August 18, 1991.
- Cross-channel gates were closed because of winter-run salmon smolts migrating through the river system.

February

- Repair work on Edmonston discharge line was completed and was being refilled.
- Cross-channel gates remained closed.

March

- Montezuma Slough Control Gates were closed from March 1 to March 24 to help the outmigrating winter-run juvenile Chinook salmon.

April

- Pumpback operations at Hyatt and Thermalito Powerplants were curtailed several times this month to keep the fish hatchery water temperature from exceeding 55 degrees.
- Hyatt Number 1 intake and penstock were returned to service.

May

- Project operation constraints for winter-run salmon were relieved on May 1.
- Thermalito Afterbay elevation was restricted for the installation of a concrete boat ramp.

June

- Maximum load on Hyatt units 2, 4, and 6 was decreased to 100 MW each due to declining lake levels.

July

- Maximum load on Hyatt units 1, 3, and 5 was decreased to 120 MW each due to declining lake levels.

August

- On August 12, the Hyatt Powerplant was declared unavailable for pumpback due to low head when the water surface elevation in Lake Oroville reached 731 ft.

September

- Due to decreasing lake elevation, the load on Hyatt Units 1 and 3 were changed to 115 MW maximum and Units 2, 4, and 6 to 45 MW minimum. Unit 5 remains at 120 MW maximum.

October

- Montezuma Slough Salinity Control Gates were placed into operation on October 1.

November

- Due to lower water temperatures in Lake Oroville, the maximum Hyatt generation limitation for hatchery temperature control was removed.

December

- Construction of the Mojave Water Agency's Morongo Basin turnout from Pool 66 began on December 8 and was completed on December 19. Water deliveries to Silverwood Lake resumed on December 19.

Water Supply Conditions

In a typical year, California receives about 193 MAF of water as rain or snow. Of this amount, about 107 MAF falls in northern California. However, about 75 percent of the demand for water originates in highly populated southern California. About 30 MAF runs off into streams or rivers and eventually flows into the Sacramento-San Joaquin Delta, the primary source of SWP's water supply.

Total runoff in the Sacramento River Basin in northern California has been as little as 5.1 MAF in 1977, and as much as 38 MAF in 1983 (the 50-year average is about 18 MAF). This runoff constitutes the primary SWP water supply.

As drought conditions continued for a sixth year into the 1991-92 water year, early winter precipitation was only 50 percent of average. Precipitation on February 1, 1992, was about 60 percent of average, significantly more than the previous year's 25 percent. February was a wet month. Statewide precipitation averaged 160 percent of normal with a range of 50 percent of average in some northeastern areas, to more than 300 percent in parts of Southern California, particularly in the normally dry south- eastern desert areas. By March 1, seasonal precipitation was 85 percent of normal, a figure that was maintained through the end of the water year.

The snowpack water content on April 1, 1992, was 60 percent of average, significantly less than the 75 percent observed a year earlier on April 1. During April, the snow melted quickly and, by May 1, the snowpack water content was only 25 percent of average.

The SWRCB's D-1485 uses a water year classification to determine specific water quality and flow standards in the Delta. In cooperation with the Central Valley Project, SWP works to ensure those standards are met by monitoring water quality and modifying releases and exports when necessary. As reported in the May 1, 1992, edition of Water Conditions in California (Bulletin 120), the unimpaired runoff in the Sacramento River basin for the 1991-92 water year was forecast to be 9.4 MAF, or 51 percent of average. Based on the 1991-92 water year forecast, the water year was classified as *"critical"* for fish and wildlife, and for agricultural, municipal, and industrial uses. The actual amount of unimpaired run-off recorded for the year was 8.9 MAF or 48 percent of average.

Water Operations

Reservoir Operations

Lake Oroville and San Luis Reservoir are the two conservation facilities for SWP water supplies. Table 8 summarizes the operations of Lake Oroville during the 1991 and 1992 calendar years. Table 13 summarizes the operation of San Luis Reservoir during the 1992 calendar year.

Lake Oroville began 1992 with 1,265,734 AF of storage, 390,271 AF more than it held at the beginning of 1991. Computed inflow peaked in February. Storage in Lake Oroville peaked on May 4 at 2,026,036 AF (57 percent of normal maximum operating capacity) and dropped to 1,402,048 AF (40 percent of normal maximum operating capacity) by December 31. The net effect of operations and water conditions at Lake Oroville in 1992 resulted in a storage decrease of 136,314 AF.

At the beginning of 1992, Lake Del Valle held 25,597 AF (62 percent of normal maximum operating capacity). Almost all of Lake Del Valle's natural inflow for the year, 12,094 AF, occurred in the months of February and March.

At the start of 1992, San Luis Reservoir held 810,305 AF, 40 percent of its normal maximum operating capacity (2,027,835 AF); the SWP share held only 409,583 AF of its maximum operating capacity (1,062,183 AF). SWP storage at the end of 1992 decreased to 383,191 AF. End-of-year federal storage was 141,225 AF, for an end-of-year total storage of 524,416 AF.

SWP southern reservoirs (Pyramid, Castaic, Silverwood, and Perris) have a combined maximum operating storage capacity of 701,320 AF. This total combined storage went from 635,732 AF at the beginning of 1992 to 580,784 AF by the end of the water year.

The following tabulation compares normal operating capacity in the principal SWP reservoirs with end-of-year storage for 1991 and 1992:

Reservoir	Normal Maximum Operating Capacity	End-of-year Storage 1991	End-of-year Storage 1992
Lake Oroville	3,537,577	1,265,734	1,402,048
Lake Del Valle	40,000	25,597	25,922
San Luis Reservoir	1,062,000	810,305	524,416
Pyramid Lake	171,196	144,281	161,221
Silverwood Lake	74,970	71,949	65,138
Lake Perris	131,452	124,055	115,004
Castaic Lake	323,702	295,477	239,421
Totals	5,340,897	2,736,796	2,533,170

Water Deliveries and Aqueduct Operations

Generally, water diverted from the Sacramento-San Joaquin Delta is delivered to SWP storage facilities and to contractors through Harvey O. Banks Delta Pumping Plant and Barker Slough Pumping Plant, for a variety of beneficial uses. In addition to delivering entitlement water to long-term water supply contractors, SWP transports water to other public agencies through exchanges or purchases, provides water for wildlife and recreational uses, and conveys water to meet local water rights agreements. Specific information about water deliveries made to long-term contractors and other agencies during 1992, and from 1962 through 1992, has been organized in Table 2.

Make-up water is allocated to contractors according to Article 12(d) and Article 14(b) of the long-term water supply contracts. No such make-up water was delivered in 1992. Long-term contractors have earned credits for make-up water according to Article 12(d) and Article 14(b) of the long-term contracts. However, the exact amount of those credits had not been determined by the end of the year.

Under provisions of their water supply contracts, South Bay and San Joaquin Valley contractors may reduce entitlement water deliveries during years in which above-average amounts of local water are available and increase deliveries by an equal amount in later years. No additional credits for wet-weather water were acquired during 1992.

In some instances, with the Department's approval, contractors may defer delivery of entitlement water to another year (carryover entitlement water) or request delivery of previously acquired entitlement water according to provisions of their water supply contracts. The carry-over program was designed to encourage the most effective use of water, and to avoid obligating the contractors to use or lose the water by December 31. In 1992, SWP delivered 92,282 AF of 1991 carryover entitlement water to seven contractors. Because operational constraints may change from year to year, an agreement in which the conditions of the approval are listed is signed each year with participating contractors. Contractors were informed of DWR's willingness to consider requests to carry over 1992 entitlement water to January, February, and March 1993. The total amount of 1992 entitlement water carried over for delivery in 1993 was 219,582 AF.

During 1992, SWP provided water service to 52 agencies, including 27 long-term water contractors. SWP facilities were used to convey non-project water for other agencies, including the CVP. In addition, SWP facilities were used to deliver water transfers, water purchased from the Drought Water Bank, and transfers from one agency to another. Transfers were accomplished according to agreements negotiated with the USBR throughout the year, and with participants of existing three-party contracts for the use of the Cross Valley Canal, a water conveyance facility that connects with the California Aqueduct in Kern County.

The Cross Valley Canal in Kern County is used by nine water or irrigation districts and two counties to obtain water from the California Aqueduct. Those districts and counties include Ducor, Hills Valley, Lower Tule River, and Pixley Irrigation districts; Kern-Tulare, Rag Gulch, and Tri-Valley Water districts; and the counties of Fresno and Tulare. All contractors except Ducor Irrigation District, received USBR water either through an exchange with another agency or through deliveries made from the canal. DWR provided the water by conveying USBR water through the California Aqueduct either directly from the Delta or from storage in San Luis Reservoir.

Total Project (State and federal) deliveries for 1992 totaled 2,704,868 AF. This total includes State contract deliveries of 1,512,997 AF, federal deliveries of 575,876 AF, Oroville Complex diversions of 613,978 AF, and Upper Feather River deliveries of 3,261 AF. The state contract deliveries include 1,389,078 AF of entitlement and entitlement-related water to 25 long-term contractors. In addition, 123,919 AF of other water, including 1,156 AF of unscheduled surplus water, was delivered through State facilities. A graph showing annual deliveries from SWP facilities is shown in Figure 1. Amounts of 1992 water deliveries are shown by field division on Map 3, and include entitlement water (including carryover entitlement), permit water, local supply, recreation, purchases, wheeling, and water transfers. Totals by agency are shown in Table 2.

On April 22, 1991, the Department signed an agreement with Kern County Water Agency to use the California Aqueduct for conveyance and storage of local water supplies from the Cross Valley Canal. The agreement, which dealt with the location of facilities, metering, and water quality, allowed the member units of the agency to pump local groundwater into the aqueduct for redistribution within their service areas. However, in some areas the groundwater could not be pumped fast enough to meet peak summer agricultural demands from May through August. The agency subsequently requested that the Department advance deliveries of surface water during this peak period and the agency would repay the loan during other months of the year by continuously pumping from the ground-water wells. This letter agreement was signed on September 24, 1991, and all the water was paid back by the end of 1992.

Prior to 1991, most water transfers in California were negotiated by the Department on a limited basis. SWP facilities were used to transfer water for SWP long-term contractors and to other agencies in California - most notably to CVP contractors. During the last few years, however, California implemented a statewide policy of transferring water.

In 1991, California began its first large-scale water transfer program when Governor Wilson established the 1991 Drought Water Bank. Based on the successful 1991 bank and the continuing drought, he established a 1992 Drought Water Bank in March 1992. Both programs were administered by the Department; with SWP facilities being used, when necessary, to transfer water.

In 1992, 7,614 AF of 1991 Drought Water Bank water was delivered to three long-term SWP contractors. As of the end of December 1992, three 1991 contracts to provide water to the bank remained in dispute. Final accounting of the 1991 water bank and adjustments to the 1991 melded water purchase rate will be computed pending resolution of the contracts.

In 1992, 62,701 AF of 1992 Drought Water Bank water was delivered to four long-term SWP contractors.

Because of the success of the 1991 and 1992 Drought Water Banks, increasing interest is being expressed in water transfers as a water management tool to alleviate short-term shortages and to augment long-term supplies.

The following table is a breakdown of State contractor deliveries in 1992:

Entitlement Water		Other Water	
M &I, Agricultural, and		General Wheeling	7,619
Municipal GW	1,254,166	Local Supply	13,512
Bypass	29,555	State Recreation	2,605
Carryover	92,282	Transfer Local Out	128
Transfer	1,590	Vallejo Permit	11,512
Benecia	4,201	Unscheduled	1,156
Vallejo	2,392	1991 Drought Bank	7,614
Exchange	4,892	1992 Drought Bank	62,701
		Net Local In & Out	2,123
		SWP Delivery	14,949
Total	**1,389,078**	**Total**	**123,919**
Total Water		**1,512,997**	

Significant Operational Activities

Significant operational activities during 1992 were as follows:

January

- Excess conditions were declared in the Delta on January 8. Balanced conditions were resumed on January 14.

February

- Uncontrolled storm water inflows, pumping into the canal, and decreased demands combined to reduce capacity in the San Luis Canal.
- Heavy mid-month natural inflows into Pyramid Lake resulted in large Piru Creek releases which caused downstream damage until the flow was reduced.
- Excess conditions were declared in the Delta on February 15, with outflows climbing to over 42,000 cfs.

March

- On March 10, Governor Wilson announced the opening of the 1992 Drought Water Bank.

April

- The Henry Miller Turnout, at mile post 238.04 in the San Joaquin Field Division, began delivering 60 cfs into the aqueduct.

May

- Lake Oroville topped out for the season on May 4 at elevation 784.90 with 2,026,000 AF in storage.

June

- The rock barrier was removed at Old River.
- The total Feather River release was increased to 2,800 cfs for Delta requirements.

July

- Pine Flat generation was terminated July 13 because the lake level dropped below the minimum level required for generation.
- Releases through the Thermalito Diversion Dam, set at 1,000 cfs, continued through July 15 for a fisheries study.

August

- The combined State and federal San Luis Reservoir storage reached the low for the year at 399,686 AF on August 27.
- On August 9, ten pumping units were brought online at Banks Pumping Plant for the first time.

September

- On September 8, seasonal drawdown began at Lake Del Valle to meet SWP demands and to make space to store local inflow to the lake.

October

- The San Luis Field Division supplied six canal dewatering pumps at the Cross Valley Canal turnout to pump La Hacienda water from the CVC into the aqueduct.

November

- DWR approved an agreement with the Mojave Water Agency for construction, operation, and maintenance of the Morongo Basin turnout.
- On November 12, the drawdown of Lake Del Valle to the minimum target storage of 25,000 AF was completed.

December

- The runoff from two series of Northern California storms produced significant flows in the Sacramento and Feather rivers.

Energy Operations

Energy Resources

Energy generation from SWP's eight hydroelectric plants (Hyatt, Thermalito, Thermalito diversion dam, Gianelli, Warne, Castaic, Alamo, and Devil Canyon) during 1992, totaled 2,039, MWh, as illustrated in Figure 2.

The SWP receives energy under contract from five small hydroelectric facilities (total capacity of 30 MW) owned and operated by MWDSC. In 1992, these plants furnished 170,436 MWh of energy to the SWP. DWR has exchange arrangements with Southern California Edison and the Los Angeles Department of Water and Power to provide transmission of this energy.

The DWR-SCE Power Contract has been in effect since April 1983. Under this contract, part of the Hyatt Thermalito Power plants' generation and all of the output of Devil Canyon Power Plant and Alamo Power Plant are delivered to SCE. The energy is generally delivered during on-peak periods and a greater amount of energy is returned during off-peak periods to compensate for the higher value of energy during on-peak periods. A total of 1,330,500 MWh was returned to the SWP in 1992, along with 2,599,395 MWh additional.

Long term contracted energy purchases, such as Tera Corp. and MWD Hydro, are itemized separately in Table 3. Other purchases totaled 765,449 MWh from various utilities, such as Bonneville Power Authority and Salt River Project.

Energy Loads

Energy load data (total energy used by the SWP) is summarized in Table 4, and Figures 5 and 6. For the purposes of balancing energy resources and loads, this report itemizes those amounts required to meet SWP supplies and demands separately from those amounts required to meet total DWR supplies and demands. Besides Project energy loads of 4,648,051 MWh, total DWR energy loads include sales of 2,467,108 MWh, losses of 214,211 MWh, and deviation adjustments of 2,702 MWh.

The San Joaquin Field Division, which includes the largest number of plants and the highest combined lift, accounted for over half of the total Project energy load. The Edmonston Pumping Plant, in the San Joaquin Field Division, used 1,698,366 MWh with peak pumping occurring in May and June. Project energy loads also include amounts that DWR is committed to supplying to agencies such as SCE, LADWP, PG& E, and the Bonneville Power Authority.

In 1992, DWR had contracts with 30 utilities for the sale of excess power. DWR sold excess power to 15 of these agencies, resulting in revenues of almost $63 million. The largest sale was 947,253 MWh to Sacramento Municipal Utility District.

Sacramento - San Joaquin Delta Operations

The Sacramento-San Joaquin Delta provides an estimated one-half of the State's water supply. In addition, the Delta is an estuary, a constantly changing area where tidal and river currents meet, and where salinity is between the extremes of brackish and fresh waters. The estuary provides habitat for fish and wildlife, including migratory birds on the Pacific Flyway.

Many of the problems facing the Delta today, such as problems with saltwater intrusion and oxidation of peat soil, have plagued the area for many years. The Delta was originally a tidal marshland covered with tules. During dry summer months, it has been subject to intrusions of brackish water from the San Francisco Bay.

Dams upstream of the Delta, including SWP's Oroville Dam and CVP's Shasta Dam and Folsom Dam, help control the intrusion of saline water by releasing fresh water into the Delta during dry periods. However, problems with salinity in the Delta still exist. Determining responsibility for and correcting the problems is not easy.

Since the project began operating in 1967, DWR has been actively involved in protecting Delta resources. Currently, DWR is reviewing its Delta water management programs in light of the Governor's California water policy. Particular attention is being paid to developing both long-term and interim solutions for water quality, fisheries, wildlife, wetlands, subsidence, and erosion.

See Chapter 11 of *DWR's Bulletin 132-93, "Preserving Delta Resources,"* and Chapter 13, *"Managing Delta Resources,"* for additional information about DWR's Delta water management programs and the effects of the Governor's water policy on those programs.

Delta Outflow Index

Direct measurements of net Delta outflow are impractical because of huge tidal flows. However, since net outflow is one of the primary factors in controlling Delta water quality, a calculated value known as the Delta Outflow Index, has been developed. The DOI represents the daily mean net flow of Delta water into Suisun Bay. Table 6 shows the daily DOI for 1992.

Several surface inflows-notably the Cosumnes, Mokelumne, and Calaveras rivers, and the Yolo Bypass flood control channel-are not included. Furthermore, the precipitation and channel depletion factors in the calculation are based on daily long-term averages, whereas Delta inflow estimates represent mean flows for that entire day. A comparison of Delta Inflow and DOI is plotted on Figure 7. Gross channel depletion is the sum of evapotranspiration and net increase in soil moisture of Delta lands plus evaporation from Delta channels.

The DOI is calculated daily from the sum of Sacramento River inflow, San Joaquin River inflow, and Sacramento Treatment Plant discharge minus the Delta consumptive use estimates and the water exported by the SWP, CVP, and Contra Costa Canal. The Delta consumptive use variable used in the DOI calculation is based on daily long-term averages. Daily inflow estimates are based on either the daily mean of hourly measurements or on an instantaneous flow measurement that represents the entire day.

The 1992 daily DOI averaged 6,877 cfs for the year and was 994 cfs higher than the 1991 daily average. The greatest mean monthly and daily DOI's occurred in February, at 22,516 cfs and 42,507 cfs respectively. The lowest monthly DOI occurred in August (2,545 cfs). The year's lowest daily DOI was on August 8 with only 1,778 cfs.

D-1485 standards set a minimum DOI at Chipps Island for adequate water for fisheries. All DOI and river flow standards were met in 1992.

Project Operations by Field Division

Oroville Field Division

Water Storage

SWP water storage facilities in the Oroville Field Division include Lake Oroville, Thermalito Forebay and Afterbay (Oroville-Thermalito Complex) and upper Feather River reservoirs consisting of Lake Davis, Frenchman Lake, and Antelope Lake. Lake Oroville operations store winter and spring runoff for later SWP use for power generation, flood control, recreation, fish and wildlife enhancement, in addition to water supply.

The Upper Feather River Reservoirs have a combined capacity of 162,000 AF. None of these reservoirs spilled in 1992. Monthly operations for the three Upper Feather River reservoirs are presented in Table 7. The table below compares storage capacity with the largest end-of-month storage for each reservoir for the last five years:

	Antelope	Frenchman	Davis
	(all values in AF)		
Capacity	22,566	55,477	84,371
1992	(Apr.) 17,596	(Feb.) 15,580	(Mar.) 40,008
1991	(May) 22,048	(Apr.) 22,590	(Apr.) 48,902
1990	(May) 22,007	(Apr.) 28,207	(Apr.) 55,713
1989	(May) 23,125	(Apr.) 37,031	(Apr.) 61,015
1988	(Apr.) 16,344	(Apr.) 32,002	(Jan.) 55,043

The total amount of unimpaired runoff to Lake Oroville for the 1991-92 water year totaled only about 1.55 MAF, 39 percent of average. Because of low storage at the beginning of 1992 and the small amount of runoff, storage peaked on May 4, 1992, at only 2,026,036 AF, 57 percent of normal maximum operating capacity. By December 31, 1992, storage declined to 1,402,048 AF, 40 percent of normal maximum operating capacity.

Lake Oroville's computed inflow is tabulated in Table 8 and plotted along with releases, diversions, and storage withdrawals on Figure 11. A ten-year historical summary of Lake Oroville's storage and inflow is illustrated on Figure 12.

Water temperatures on and below the lake's surface are monitored very closely throughout the year at various locations around the lake. Two intakes to the powerplant have shutters that control the depth from which water enters the plant. The temperature of water entering the fish hatchery can then be controlled by adding or removing shutters as necessary. A complete illustration of water temperature and intake structure operation is shown on Figure 14. Further discussions on water temperature operations are detailed in *"Water Deliveries and Aqueduct Operations."*

Water Deliveries

Project water stored in the Upper Feather Area lakes flows into Lake Oroville through the North and Middle Forks of the Feather River. Contract deliveries totaled 6,115 AF to three agencies. Non-project deliveries (prior water rights) totaling 2,017 AF were made out of Lake Davis and Frenchman Reservoir.

Water stored in Lake Oroville is released into the Thermalito Diversion Dam Pool, from which specified quantities are released into both the Feather River and the Thermalito Power Canal. The power canal supplies water first to the Thermalito Forebay and then to Thermalito Afterbay. From the Thermalito Afterbay, additional water is released to the Feather River and several local distribution systems used to deliver water to prior water right holders. These deliveries are collectively called the Feather River Service Area diversions and are delivered to the Sutter-Butte Canal, Richvale Canal, Sunset Pumps, Western Canal Lateral, Western Canal, Tudor Mutual, Garden Highway, Plumas Mutual, Oswald Water District, and Palermo Canal outlets. FRSA diversions are not considered SWP benefits, as they predate the SWP construction, and would have occurred in the absence of the SWP to the limit of available natural river flows. Nearly all FRSA diversions are for agricultural use and totaled 606,675 AF in 1992, an increase of 50,414 AF over 1991. All FRSA diversions are detailed below:

Sutter Butte Canal	307,171
Richvale Canal	56,621
Sunset Pumps	21,824
Western Canal Lateral	2,698
Western Canal	190,838
Tudor Mutual	3,058
Garden Highway	10,101
Plumas Mutual	7,544
Oswald Water District	295
Palermo Canal	6,525
Total in AF	606,675

A comparison of 1991 and 1992 Diversion Dam, Forebay, and Afterbay water surface elevations and storage is presented on Table 9.

Delta Field Division

Water Storage

The Delta Field Division consists of the North Bay Aqueduct, the South Bay Aqueduct, and the California Aqueduct from Clifton Court Forebay to Check 12. Along these waterways, water storage operations take place at Clifton Court Forebay, Bethany Reservoir, Travis Tank, Napa Terminal Tank, the California Aqueduct, and Lake Del Valle.

Inflow and storage changes for the last ten years at Lake Del Valle are shown on Figure 15.

Project water flows from the Delta into Clifton Court Forebay through the Clifton Court control gates. A schedule of daily gate operation is published in the *SWP Monthly Report of Operations*. Monthly inflows to Clifton Court Forebay along with corresponding storage changes are shown in Table 11.

Water Deliveries

The Delta Field Division delivered 145,564 AF in 1992. These and other deliveries are summarized in Table 2.

The North Bay Aqueduct system, completed in May 1988, begins in the North Delta at the Barker Slough Facilities. Sacramento River water is conveyed through Cache, Lindsey, and Barker sloughs to the Barker Slough pumping plant. From the pumping plant, water is conveyed by pipe for 24 miles northwest to contractors in Napa and Solano Counties and to the Cordelia Pumping Plant. Deliveries are made to Solano County water users via turnouts along the pipe's length. From the Cordelia Pumping Plant, the North Bay Aqueduct terminates at the Napa Terminal Tank. The Aqueduct supplied 31,596 AF to Napa and Solano counties.

A division-wide total of 145,263 AF went to SWP entitlement contractors. This total includes 94,037 AF of 1992 entitlement deliveries; 3,637 AF of carryover entitlement; and 47,589 AF of other water which included the only delivery of unscheduled water (1,156 AF) during 1992. The unscheduled delivery was made to the Napa Flood Control and Water Conservation District. Deliveries of 9 AF of 1991 Drought Water Bank supply, 13,781 AF of 1992 Drought Water Bank supply, and 7,619 AF of General Wheeling were conveyed to the city of San Francisco. Deliveries of 11,512 AF of Vallejo Permit Water (local water right) were conveyed to Solano Flood Control and Water Conservation District. Deliveries of 13,512 AF of Local Supply were conveyed to Alameda County Flood Control and Water Conservation District (Zone 7), and Alameda County Water District

Pumping Plants

Delta Field Division pumping plants include Barker Slough and Cordelia on the North Bay Aqueduct, Banks on the California Aqueduct, and South Bay and Del Valle on the South Bay Aqueduct. Monthly pumping data is summarized for the year in Table 1.

Banks Pumping Plant was built to accommodate 11 units. Initially, seven pumps were constructed for a total pumping capacity of 6,400 cfs. Construction of the final four pumps was completed in 1990, each with a design capacity of 1,067 cfs and a new total capacity of 10,500 cfs. On August 9, 10 units were brought online for the first time in a six-hour test period. Export pumping rates are increased on weekends to take advantage of less costly off-peak electricity. This produces sharp peaks in the export rate at 7-day intervals.

There was 34,816 AF of federal pumping at Banks in 1992 for the CVP's Cross Valley Canal Contractors, which are located north of Bakersfield. The entire amount was pumped during September, October, and November. The Cross Valley Canal contractors consist of nine water or irrigation districts and two counties, who are serviced through a California Aqueduct turnout to Kern County Water Agency's Cross Valley Canal. Below is a five-year summary of federal, State, and total pumping at Banks.

Pumping at Banks Pumping Plant(in AF)

Year	Federal	State	Total
1992	34,816	1,467,844	1,502,660
1991	51,642	1,643,819	1,695,461
1990	205,208	2,210,756	2,415,964
1989	373,209	3,409,326	3,782,535
1988	488,027	2,166,266	2,654,293

San Luis Field Division

Water Storage

San Luis Reservoir reached its maximum end-of-month storage for the year, 1,899,427 AF, in March. Maximum operating storage capacity in San Luis is 2,027,835 AF. Minimum end-of-month storage for the year, 362,822 AF, occurred in October. The State's share of San Luis Reservoir end-of-month storage reached the maximum of 991,840 AF in March, while the minimum of 296,535 AF was reached in November. Table 13 (below) and Figure 16 show San Luis Reservoir operations during 1992. Table 14 shows the monthly operation of O'Neill Forebay during 1992.

Pumping and Generating Plants

Total pumping in 1992 at Gianelli Pumping-Generating Plant was 1,563,152 AF. Total water released from San Luis Reservoir to O'Neill Forebay for generation was 1,705,543 AF. Total pumping at Dos Amigos Pumping Plant in 1992 was 1,827,115 AF, about 37,000 AF more than was pumped in 1991. Table 15 summarizes joint-use plant activity on a monthly basis.

Water Deliveries

SWP water deliveries in the San Luis Field Division during 1992 included 690 AF of State and federal deliveries to the DFG and the Department of Parks and Recreation (DPR) from the O'Neill Forebay and San Luis Reservoir area (Reach 3). Similar deliveries out of Reach 5 totaled 154 AF. The following tabulation details the components of these recreation deliveries:

O'Neill Forebay and San Luis Reservoir (Reach 3)			
	DPR	DFG	Total
State	72	307	379
Federal	59	252	311
Sub-total	131	559	690
Pools 16, 17, & 18 (Reach 5)			
	DPR	DFG	Total
State	84	0	84
Federal	70	0	70
Sub-total	154	0	154

Federal deliveries from the joint-use facilities in the San Luis Field Division during 1992 totaled 541,187.

Table 13. San Luis Reservoir Monthly Operation 1992

(In AF except as noted)

Month	Reservoir Storage			Inflow	Outflow			Gain (+) Loss (-)	Evaporation	Precipitation (in inches)
	Water Surface Elevation (in ft)	Storage	Storage Change	Gianelli P-G Plant Pumping	Gianelli P-G Plant Generation	Pacheco Tunnel	Spill			
JAN	463.22	1,106234	295,929	311,791	1,469	4,039	0	-10,354	1,097	0.30
FEB	489.90	1,393,332	287,098	298,286	2,208	2,748	0	-6,232	1.724	1.87
MAR	532.78	1,899,427	506,095	536,905	0	8,425	0	-22,385	2,410	4.64
APR	529.19	1,855,018	-44,409	93,837	119,732	15,616	0	-2,898	6,327	0.45
MAY	505.54	1,571,692	-283,326	0	270,639	11,925	0	-762	8,971	0.18
JUN	464.72	1,121,789	-449,903	0	439,605	11,040	0	742	10,739	0.00
JUL	418.46	677,191	-444,598	0	438,172	10,808	0	4,382	11,316	0.00
AUG	385.64	413,450	-263,741	27,983	284,805	7,269	0	350	7,888	0.00
SEP	394.11	476,863	63,413	78,095	3,991	5,864	0	-4,827	7,230	0.00
OCT	378.53	362,822	-114,041	4,096	111,763	5,583	0	-791	5,154	0.27
NOV	381.11	380,915	18,093	49,066	23,730	2,095	0	-5,148	2,521	0.26
DEC	400.19	524,416	143,501	163,093	9,429	4,880	0	-5,283	1,196	1.28
TOTAL			-285,889	1,563,152	1,705,543	90,292	0	-53,206	66,573	9.32

San Joaquin Field Division

Water Deliveries

A total of 576,442 AF of deliveries were made in the San Joaquin Field Division in 1992. There were five SWP water service contractors who took delivery of 542,288 AF. Types of water delivered include entitlement water, groundwater demonstration, carry-over entitlement, drought water bank, local, exchange, and transfer water. Kern County Water Agency (KCWA) received 92 percent of the total SWP water delivered within the Division.

In addition to SWP deliveries, 34,154 AF of federal water was wheeled through SWP facilities. The table below itemizes federal wheeling in the San Joaquin Field Division.

Federal Wheeling	
Agency	Agency Total
Kern National Wildlife Refuge	6,030
Fresno County	750
Hills Valley Irrigation District	836
Kern-Tulare Water District	9,328
Lower Tule River	7,776
Pixley Irrigation District	6,947
Rag Gulch Water District	875
Tri-Valley Water District	285
Tulare County	1,327
Total Federal Wheeling	34,154

Map 2 and Table 2 break down water deliveries by agency and water type.

The San Joaquin Field Division is the only field division in the SWP where there are no water storage facilities. All deliveries are made from the Aqueduct and are summarized in the Appendix, Table 22.

Pumping Plants

Pumping plants in the San Joaquin Field Division include Las Perillas and Badger Hill on the Coastal Aqueduct, and Buena Vista, Teerink, Chrisman, and Edmonston on the California Aqueduct. A complete monthly summary of amounts pumped at all of these plants is shown on Table 1. A summary of energy used to pump at each plant is shown on Table 4.

During 1992, 1,318,583 AF State water and 34,154 AF federal water flowed past Check 21 into the San Joaquin Field Division. Edmonston Pumping Plant pumped 752,203 AF south of the Tehachapi Mountains.

Southern Field Division

Water Storage

There are four storage reservoirs in the Southern Field Division with a combined storage capacity of 701,320 AF. Combined storage at the beginning of the year was 635,732 AF. End-of-year combined storage was 580,784 AF.

Water Deliveries

SWP deliveries in the Southern Field Division totaled 823,592 AF. Twelve agencies received the water, which was almost all entitlement water. One exception was 1,995 AF of recreation water to the California Department of Parks and Recreation and the Los Angeles County Department of Recreation. Metropolitan Water District of Southern California received the largest total delivery for 1992 from the SWP at 716,250 AF.

Pumping and Generating Plants

Pumping plants in the Southern Field Division include Oso and Castaic on the West Branch, and Pearblossom on the East Branch. SWP pumped 752,203 AF of water into the Southern Field Division in 1992. A complete monthly summary of amounts pumped is shown on Table 1. A summary of energy used to pump and of station service energy at each plant is shown on Table 4.

Generating plants in the Southern Field Division include Warne and Castaic on the West Branch, and Alamo and Devil Canyon on the East Branch. Energy produced by each generating plant is summarized in Table 3. Combined generation at all four plants totaled 1,013,317 MWh.

Table 1. Project Pumping by Plant
1992
(in acre-feet)

Pumping Plants	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hyatt*	0	2,335	73,056	16,408	12,287	41,666	19,526	0	168	0	0	0	165,446
Thermalito*	0	21,992	95,992	19,461	16,951	56,098	30,749	0	0	0	0	0	241,243
Barker Slough	2,695	2,234	2,726	3,370	4,556	3,429	2,598	2,733	2,621	2,493	2,063	1,718	33,236
Cordelia	1,897	1,504	1,556	2,195	2,894	1,922	2,127	2,248	1,494	1,554	1,312	1,160	21,863
South Bay	7,038	3,723	3,531	10,691	9,595	9,672	8,111	15,102	8,339	7,000	10,121	8,777	101,700
Del Valle	0	270	988	4,052	2,024	0	0	0	0	0	0	0	7,334
Banks													
State	185,310	202,896	385,962	70,757	43,021	56,138	23,107	91,119	150,785	25,850	62,769	170,130	1,467,844
Federal	0	0	0	0	0	0	0	0	14,000	16,816	4,000	0	34,816
Total	185,310	202,896	385,962	70,757	43,021	56,138	23,107	91,119	164,785	42,666	66,769	170,130	1,502,660
Gianelli * 1/													
State	134,433	177,063	308,562	35,454	0	0	0	27,983	58,507	4,096	11,397	98,991	856,486
Federal	177,358	121,223	228,343	58,383	0	0	0	0	19,588	0	37,669	64,102	706,666
Total	311,791	298,286	536,905	93,837	0	0	0	27,983	78,095	4,096	49,066	163,093	1,563,152
O'Neill * 2/													
State	0	0	0	0	0	0	0	0	0	0	0	0	0
Federal	185,466	112,902	187,194	60,914	0	0	0	1,688	32,578	2,793	38,805	69,634	691,974
Total	185,466	112,902	187,194	60,914	0	0	0	1,688	32,578	2,793	38,805	69,634	691,974
Dos Amigos 1/													
State	56,066	15,274	32,786	93,313	160,719	230,778	224,211	169,590	109,117	104,815	68,415	68,944	1,334,028
Federal	612	876	21,981	24,802	83,682	145,616	121,502	90,733	3,283	0	0	0	493,087
Total	56,678	16,150	54,767	118,115	244,401	376,394	345,713	260,323	112,400	104,815	68,415	68,944	1,827,115
Las Perillas	20	439	4,157	8,793	17,643	18,990	18,284	10,593	7,075	5,173	506	242	91,915
Badger Hill	24	427	4,249	8,866	17,696	19,216	18,284	10,593	7,075	5,173	506	229	92,338
Buena Vista	59,644	14,276	13,496	49,739	123,073	118,285	93,821	92,048	90,422	87,656	60,575	67,295	870,330
Teerink	59,687	14,233	10,712	42,037	111,175	102,792	77,819	78,129	86,301	84,837	60,097	68,297	796,116
Chrisman	58,799	13,276	10,279	39,693	106,719	97,323	74,331	76,380	84,937	83,462	60,476	68,246	773,921
Edmonston	58,411	13,168	9,850	38,574	104,791	93,899	72,073	73,193	82,650	81,417	58,678	65,499	752,203
Oso	45,837	10,680	1,061	20,619	44,353	48,059	30,854	19,495	37,129	41,652	32,613	48,073	380,425
Castaic* 3/	105,751	40,601	50,600	50,119	18,434	30,527	61,452	69,631	34,812	58,927	59,000	55,725	635,579
Pearblossom	12,085	2,402	7,534	15,741	56,535	39,997	35,158	48,083	41,318	35,870	23,678	16,809	335,210

1/ Joint State-Federal Facility.

2/ O'Neill Pumping Plant is a federal facility.

3/ Pumping at Castaic Pumping Plant is by and for the City of Los Angeles.

* Pumping-generating plants. This table includes only the pumping portion of operations of these plants.

Table 2. Water Deliveries 1962-1992

(in acre-feet)

Agency	1962-1987	1988	1989	1990	1991	1992	TOTALS
Oroville Field Division							
Last Chance Creek W.D. (Local Supply)	166,085	6,988	11,487	7,046	7,010	4,988	203,604
Plumas Co. F.C. & W.C.D.	6,175	523	486	548	420	485	8,637
County of Butte	5,329	385	300	380	328	117	6,839
Thermalito I.D. (Local Supply)	17,099	2,417	2,152	2,272	2,124	2,315	28,379
Prior Water Rights Deliveries 1/	15,940,679	832,786	810,458	860,543	558,143	608,692	19,611,301
Yuba City	586	303	403	494	265	642	2,693
Delta Field Division							
Napa CO. F.C. & W.C.D.	94,554	7,038	10,153	13,313	10,018	5,510	140,586
Alameda Co. W.D.	442,059	33,464	26,042	31,703	30,126	24,250	587,644
A.C.F.C. & W.C.D., Zone 7 (Local Supply)	357,533	27,252	28,185	33,975	14,101	23,084	484,130
Pleasanton Township W.D.	674	0	0	0	0	0	674
Santa Clara Valley W.D.	1,233,971	87,961	107,085	120,962	87,253	42,839	1,680,071
Marin W.D.	4,594	0	0	0	0	0	4,594
San Francisco W.D.	4,345	0	0	332	51,135	21,255	77,067
Skylonda M.W.D.	10	0	0	0	0	0	10
Oak Flat W.D.	114,759	4,412	6,391	3,212	1,472	2,239	132,485
Mustang W.D.	4,256	0	0	0	0	0	4,256
Granite Construction	120	0	0	0	0	0	120
Lake Del Valle (E.B.R.P.D.)	1,540	142	152	168	150	147	2,299
Orestimba Creek	100	0	0	0	0	0	100
CVP Water	3,789	620	473	38	77	154	5,151
Solano Co. F.C.W.C.D.	2,950	13,452	17,364	19,879	24,527	26,086	104,258
San Luis Field Division							
Dept. Parks & Rec. (State)	574	7	64	70	59	72	846
Dept. Fish & Game (State)	5,472	380	429	145	110	391	6,927
Fed. Customers (Rec.+ Joint-Use)	20,445,529	1,421,166	1,303,249	992,022	504,401	541,568	25,207,935
Fed. Customers (Misc.)	98,394	149,192	0	0	0	0	247,586
San Joaquin Field Division							
Tulare Lake Basin W.S.D.	2,163,721	94,316 6/	181,963	90,312	2,180	78,558	2,611,050
Empire West Side I. D.	68,597	3,475 7/	3,000	3,310	221	1,354	79,957
County Of Kings	41,900	4,000	4,000	2,000	0	1,806	53,706
Hacienda W.D. 2/	75,895	0	0	0	0	0	75,895
Kern County Water Agency	14,514,392	1,009,520	1,146,062	862,448	223,928	446,625	18,202,975
Kern Water Bank 4/	7,501	0	0	0	0	0	7,501
Dudley Ridge Water District	1,091,298	47,994	57,049 9/	36,657	14,454	13,945	1,261,397
Devils Den Water District	306,612	11,534	14,645	6,440	716	0	339,947
J.G. Boswell	117,430	0	0	0	0	0	117,430
Shell Cal Prod. 3/	85,914	0	0	0	0	0	85,914
Green Valley Water District	11,054	0	0	0	0	0	11,054
Federal Wheeling	708,514	153,211 8/	172,656	74,746	23,845	34,154	1,167,126
Wheeler Ridge W.S.D.	92	0	0	0	0	0	92
Southern Field Division							
A.V.E.K. W.A.	546,454	34,079	45,280	47,206	8,607	31,927	713,553
M.W.D. Of S.C.	7,901,387	902,564	1,156,698	1,396,423	606,447	716,250	12,679,769
Littlerock Creek I. D.	6,087	419	971	1,747	522	251	9,997
Mojave Water Agency	57,606	9	200	0	2,032	9,334	69,181
Desert Water Agency	264,800	34,000	36,500	38,100	11,430	17,197	402,027
Coachilla Valley Water District	168,207	20,652	21,873	23,100	6,930	10,427	251,189
Crestline-Lake Arrowhead Water Agency	17,735	2,006	2,170	1,950	1,561	264	25,686
San Gabriel Valley M.W.D.	79,995	8,948	12,839	16,649	5,399	11,971	135,801
San Bernardino Valley M.W.D. 5/	181,340	21,386	20,782	18,831	7,177	5,113	254,629
Santa Barbara	0	0	0	0	1,240	0	1,240
Dept. Parks & Rec., L.A. Co. Rec. Dept.	28,579	4,360	7,490	8,879	4,560	1,995	55,863
Piru Creek Fish Enhancement	2,915	0	0	0	0	0	2,915
Castaic Lake Water Agency	79,943	18,904	21,719	22,139	7,357	14,812	164,874
Palmdale Water District	10,033	1,770	9,009	8,608	3,914	4,035	37,369
United Water C.D. (Local Supply)	998	0	0	0	0	0	998
Ventura County FCD	0	0	0	4,836	988	0	5,824
Los Angeles Dept. of Water and Power	0	0	0	0	0	16	16
Lilico Pictures	0	0	10	0	0	0	10
Totals	67,490,175	4,961,635	5,239,789	4,751,483	2,225,227	2,704,868	87,373,177

1/ Includes Thermalito Afterbay, Palermo Canal, Upper Feather Lakes deliveries.

2/ Hacienda Water District was annexed by Tulare Lake Basin WSD in 1981.

3/ Repayment of pre-consolidation water.

4/ Advance storage of groundwater, by agreement between KCWA and DWR.

5/ Includes 324 acre-feet of Local-Out.

6/ Includes 1,550 acre-feet transferred to Westlands WD (Federal).

7/ Includes 300 acre-feet transferred to Tulare Lake BWSD as Entitlement.

8/ Includes 3,000 acre-feet transferred to Westlands WD (Federal).

9/ Includes 2,500 acre-feet of transferred entitlement water.

Table 3. Project Energy Resources
1992

(in megawatt-hours)

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hyatt-Thermalito 1/	32,071	19,512	55,578	21,099	143,544	119,619	138,679	112,213	90,795	51,847	35,663	47,004	867,624
Gianelli													
State	266	431	0	17,793	31,155	40,416	37,408	17,603	324	9,821	2,409	1,278	158,904
Federal	0	0	0	14,824	37,887	57,706	45,632	25,721	240	5,693	768	0	188,471
Total	266	431	0	32,617	69,042	98,122	83,040	43,324	564	15,514	3,177	1,278	347,375
CEA Energy 2/	34,380	34,380	34,380	0	34,430	34,380	34,630	43,860	44,150	30,390	39,090	48,430	412,500
Warne 3/	27,240	6,346	2,018	12,213	27,042	29,640	19,171	11,208	22,564	24,648	19,821	29,305	231,216
Castaic	34,847	16,890	3,912	25,357	42,072	46,800	30,960	14,592	34,584	37,568	30,168	45,192	362,942
Alamo	814	156	457	1,275	4,003	3,242	2,765	3,072	2,888	2,658	2,153	1,066	24,549
Devil Canyon	10,166	8,329	11,048	19,961	56,738	48,556	41,832	53,202	51,147	42,358	22,849	28,424	394,610
Tera Corp.	22	28	78	209	549	645	733	783	391	146	60	66	3,710
MWD Hydro	9,273	7,436	8,769	13,481	17,999	19,798	16,748	18,018	18,168	17,970	10,890	11,886	170,436
Reid Gardner	118,968	91,487	35,142	0	60,451	98,708	106,912	122,962	112,660	114,782	105,841	105,709	1,073,622
Pine Flat	0	0	461	14,446	22,221	49,445	8,860	0	0	0	0	0	95,433
Purchases 4/	68,707	71,463	105,356	70,765	54,212	68,759	45,080	46,410	52,900	58,300	60,825	62,672	765,449
Other Sources/Exchanges 5/	9,116	14,039	17,052	9,939	15,986	32,346	14,847	32,111	11,575	11,581	228	2,862	171,682
SCE Return Additional	169,559	92,320	190,574	167,394	150,831	112,215	281,434	326,027	281,461	294,096	342,843	190,641	2,599,395

1/ Includes Table Mountain and Hyatt out adjusted to Tesla.

2/ Entitlement energy supplied to SCE under several long-term contracts.

3/ Includes station-service energy.

4/ Includes Salt River Project, Portland General Electric, British Columbia Hydro Authority, Southern California Edison, Bonneville Power Authority, Seattle City Light, Washington Water & Power Co., Montana Power Co., Pacific Power & Light, Puget Sound Power and Light, Western Area Lower Colorado, Nevada Power, and Eugene Water and Electric Board.

5/ Includes Southern California Edison, Western Area Mid-Pacific, Los Angeles Dept. of Water and Power, Bonneville Power Authority, City of Vernon, Northern California Power Authority, and Pacific Gas & Electric.

State:	7,332,072
Federal:	188,471
Total Project:	7,520,543

Table 4. Total Energy Loads
1992

(in megawatt-hours)

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hyatt-Thermalito Pumpback and Station Service	357	4,152	57,228	11,829	9,863	33,861	16,210	137	284	21	37	275	134,254
North Bay 1/	644	784	868	812	728	0	100	3,192	3,000	3,047	3,000	2,800	18,975
South Bay	5,584	3,245	3,111	8,466	7,727	7,672	6,574	12,304	6,772	5,550	8,509	7,351	82,865
Del Valle	12	27	80	292	174	5	7	7	6	6	6	14	636
Banks													
State	55,999	60,356	114,479	21,462	13,372	16,876	7,211	27,016	43,861	7,805	18,353	48,847	435,637
Federal	0	0	0	0	0	0	0	0	4,158	4,995	1,188	0	10,341
Bottlerock 2/	121	114	122	100	77	72	73	63	66	89	110	123	1,130
Gianelli													
State	38,413	54,807	107,814	16,083	235	171	173	5,694	12,202	1,167	2,631	20,939	260,329
Federal	50,110	37,287	80,788	26,237	0	0	0	0	4,042	0	7,075	13,207	218,746
Dos Amigos													
State	7,510	2,227	4,490	12,252	21,660	30,189	28,743	21,576	13,837	13,179	8,808	9,430	173,901
Federal	81	108	2,839	3,225	11,280	19,017	15,585	11,470	405	0	0	0	64,010
Pine Flat 2/	245	172	198	0	0	0	119	210	197	220	226	244	1,831
Las Perillas	25	47	298	639	1,312	1,404	1,357	775	510	367	56	40	6,830
Badger Hill	19	85	775	1,687	3,428	3,666	3,649	2,022	1,356	955	105	56	17,803
Buena Vista	14,845	3,719	3,430	12,177	29,981	28,877	22,970	22,478	21,950	21,262	14,782	16,513	212,984
Teerink	16,696	4,072	3,225	11,782	30,867	28,429	21,554	21,662	24,031	23,610	16,640	18,968	221,536
Chrisman	38,213	8,971	7,070	25,536	67,887	61,667	47,320	48,194	53,770	52,593	37,962	42,577	491,760
Edmonston	133,142	30,503	23,314	87,363	236,123	210,882	161,513	164,919	186,145	183,355	132,150	148,957	1,698,366
Oso	12,615	3,110	522	5,713	12,083	12,989	8,448	5,506	10,034	11,374	8,986	13,114	104,494
Pearblossom	8,704	2,073	5,485	10,858	38,192	27,055	23,900	32,284	27,880	24,274	16,233	11,688	228,626
Warne 2/	41	103	141	62	10	2	57	117	13	48	49	4	647
Sales	129,216	139,781	75,245	88,257	133,522	175,661	362,904	349,135	221,759	265,438	340,390	185,800	2,467,108
Other Project Loads 3/	33,959	34,924	43,733	47,580	33,614	44,848	45,679	59,622	77,472	69,649	42,599	21,768	555,447
Actual Deviation	561	677	425	432	-180	-667	-581	-272	111	-121	940	1,377	2,702
Losses	18,507	8,867	12,772	10,551	20,556	20,910	22,078	25,421	18,352	12,278	20,269	23,650	214,211

1/ Includes Barker Slough, Cordelia, and Cordelia Interim Pumping Plants.

2/ Station Service only.

3/ Includes Southern California Edison, Bonneville Power Authority, City of Vernon, Pacific Gas & Electric, Nevada Power, South Bay Station Service, Northern California Power Agency, and Western Area Mid Pacific.

Total State:	7,332,072
Total Federal:	293,097
Total Project:	7,625,169

Table 5. Sacramento Basin and Sacramento-San Joaquin Delta Operations

1992

(in thousands of acre-feet except as noted)

Month	Upstream Reservoir Releases To River			Sacramento River In-Basin Use 2/	Delta Inflow			Delta Uses			Delta Exports		
	Keswick 1/	Oroville 1/	Nimbus		Sacramento River at Sacramento 3/	San Joaquin River at Vernalis 4/	Total 5/	Consumptive	Outflow Index		Total	DWR	USBR 6/
									Total	Average CFS			
Jan	201	65	58	350	650	60	710	-56	395	6,426	185	185	0
Feb	189	59	52	1,188	1,503	115	1,618	-38	1,286	22,516	203	203	0
Mar	265	53	56	908	1,251	91	1,342	-10	746	12,128	386	386	0
Apr	197	49	45	318	559	86	645	63	432	7,259	71	71	0
May	419	129	98	-232	387	58	445	121	221	3,597	43	43	0
Jun	421	101	221	-232	498	30	528	191	233	3,917	56	56	0
Jul	463	142	203	-276	505	28	533	268	183	2,980	23	23	0
Aug	496	150	147	-247	533	29	562	252	156	2,545	91	91	0
Sep	419	149	49	-35	583	38	621	174	195	3,282	165	151	14
Oct	245	91	39	20	418	53	471	118	252	4,102	43	26	17
Nov	182	60	31	128	387	59	446	55	260	4,364	67	63	4
Dec	186	72	31	481	774	61	835	2	579	9,414	170	170	0
Total	3,683	1,120	1,030	2,371	8,048	708	8,756	1,140	4,938	---	1,503	1,468	35

1/ Time lagged values (Keswick: 5 days; Oroville: 2 days).

2/ Positive values are accretions; negative values are depletions.

3/ These values are based on a measured daily average taken from the Sacramento River at Freeport.

4/ These values are based on daily 6 a.m. readings.

5/ Includes Sacramento County Regional Waste Treatment Plant.

6/ USBR water pumped at Banks Pumping Plant.

Table 6. Delta Outflow Index
1992

(in cfs-days except as noted)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	6,567	8,412	15,071	3,429	2,379	5,525	3,878	2,583	2,292	4,051	6,584	4,055
2	6,091	8,438	12,502	1,945	2,089	5,526	3,558	2,566	2,653	3,683	5,311	4,615
3	6,571	9,024	9,520	5,454	2,099	6,496	3,377	2,280	2,551	3,553	3,689	5,536
4	5,728	9,078	7,953	6,043	2,083	5,500	3,588	2,235	4,547	3,056	2,665	5,042
5	6,843	9,584	7,074	6,260	2,396	5,804	3,036	2,238	2,680	3,036	2,531	5,473
6	7,543	9,574	6,198	6,272	3,570	5,681	2,673	2,074	2,557	3,317	2,976	7,176
7	6,932	8,834	8,272	6,322	3,596	4,910	2,611	2,323	2,098	2,557	3,579	7,418
8	5,721	8,988	13,813	5,375	3,084	4,638	2,092	1,778	2,700	3,045	3,023	9,000
9	7,743	9,036	19,098	6,001	3,100	4,047	2,484	2,394	3,014	3,081	3,050	8,763
10	9,479	8,620	19,450	7,418	2,930	3,458	1,886	2,291	3,083	3,034	3,052	12,497
11	8,958	9,429	15,460	8,199	3,052	3,848	2,136	2,239	3,439	3,537	3,054	15,928
12	7,545	10,492	12,344	8,523	3,592	3,865	2,539	2,135	3,233	3,716	3,387	24,729
13	4,093	18,521	9,019	8,847	3,635	3,814	3,391	3,554	2,546	4,447	4,725	27,327
14	5,160	29,805	7,331	9,498	3,671	3,272	3,097	2,706	2,940	4,523	4,944	26,692
15	5,514	32,067	6,805	9,831	3,884	3,373	3,068	2,528	2,721	4,425	5,036	23,269
16	5,560	37,875	6,686	10,936	4,176	3,067	3,196	2,613	3,557	4,103	4,550	16,968
17	6,055	42,507	7,515	11,365	4,705	3,154	3,277	2,604	3,866	3,613	4,574	13,019
18	6,579	41,329	14,184	10,377	4,124	3,071	2,462	2,480	4,026	3,878	4,522	10,984
19	6,669	37,633	21,708	9,872	4,590	3,003	2,571	1,976	4,538	3,794	4,055	9,549
20	6,016	32,771	23,716	9,230	4,457	3,090	2,180	2,408	4,561	4,085	4,069	7,155
21	5,403	31,803	23,970	9,719	4,116	3,069	2,344	2,547	3,528	4,605	4,077	4,965
22	5,356	34,877	20,491	9,726	4,050	3,033	2,132	2,580	4,056	4,286	4,553	4,574
23	4,567	36,893	17,128	9,076	3,712	3,217	2,559	2,560	3,362	3,522	4,788	4,536
24	4,635	36,836	14,400	8,195	3,584	2,889	2,632	2,545	4,043	3,573	6,364	4,050
25	5,092	33,856	11,345	7,176	4,082	2,663	2,959	3,717	2,633	4,035	5,549	4,003
26	5,739	28,923	10,166	6,106	4,081	2,801	3,773	3,223	2,475	4,646	5,543	3,931
27	6,521	24,475	9,085	5,331	4,059	3,367	4,266	2,870	2,677	5,651	5,039	3,893
28	6,969	20,764	7,958	4,772	5,021	3,729	4,096	2,614	4,109	5,191	5,310	3,082
29	7,500	17,808	6,920	3,735	4,004	3,797	3,934	3,090	3,992	5,677	5,540	2,994
30	8,008		5,834	2,748	3,526	3,804	3,549	2,565	3,977	6,280	4,782	4,039
31	8,062		4,944		4,066		3,022	2,579		7,162		6,569
Total	199,219	648,252	375,960	217,781	111,513	117,511	92,366	78,895	98,454	127,162	130,921	291,831
Ave.	6,426	22,516	12,128	7,259	3,597	3,917	2,980	2,545	3,282	4,102	4,364	9,414
Max.	9,479	42,507	23,970	11,365	5,021	6,496	4,266	3,717	4,561	7,162	6,584	27,327
Min.	4,093	8,412	4,944	1,945	2,083	2,663	1,886	1,778	2,098	2,557	2,531	2,994
Total In AF	395,151	1,285,808	745,717	431,969	221,186	233,083	183,208	156,488	195,284	252,226	259,682	578,847

Annual Total = 2,489,865 cfs days

or 4,938,647 acre-feet

Table 7. Upper Feather Area Lakes Monthly Operation

1992

(in acre-feet except as noted)

Month	Lake Storage			Outflow							Inflow
				Regulated Release							
	Water Surface Elevation (in feet)	Storage*	Storage Change	Stream-Flow Maint.	Water Supply Contract	Prior Water Rights	Total Regulated Release	Spill	Estimated Evaporation And Seepage	Total Outflow	Computed
Antelope Lake			Capacity 22,566 acre-feet								
Jan	4,994.98	16,568	-384	615	0	0	615	0	53	668	284
Feb	4,995.21	16,748	180	575	0	0	575	0	62	637	817
Mar	4,995.71	17,141	393	615	0	0	615	0	94	709	1,102
Apr	4,996.28	17,596	455	511	0	0	511	0	160	671	1,126
May	4,995.65	17,094	-502	307	0	0	307	0	472	779	277
Jun	4,994.82	16,444	-650	298	0	0	298	0	471	769	119
Jul	4,993.99	15,810	-634	307	0	0	307	0	414	721	87
Aug	4,993.01	15,081	-729	307	0	0	307	0	454	761	32
Sep	4,992.15	14,458	-623	298	0	0	298	0	349	647	24
Oct	4,991.78	14,195	-263	307	0	0	307	0	121	428	165
Nov	4,991.28	13,844	-351	298	0	0	298	0	202	500	149
Dec	4,991.88	14,266	422	307	0	0	307	0	77	384	806
Total	---	---	-2,686	4,745	0	0	4,745	0	2,929	7,674	4,988
Frenchman Lake			Capacity 55,477 acre-feet								
Jan	5,552.13	15,215	155	123	0	0	123	0	49	172	327
Feb	5,552.64	15,580	365	115	0	0	115	0	72	187	552
Mar	5,552.41	15,414	-166	69	0	338	407	0	86	493	327
Apr	5,551.50	14,774	-640	64	375	132	571	0	212	783	143
May	5,547.20	11,995	-2,779	0	2,472	0	2,472	0	389	2,861	82
Jun	5,544.84	10,652	-1,343	0	1,032	0	1,032	0	362	1,394	51
Jul	5,542.78	9,568	-1,084	5	802	0	807	0	322	1,129	45
Aug	5,541.43	8,897	-671	14	307	0	321	0	364	685	14
Sep	5,541.22	8,796	-101	20	0	0	20	0	168	188	87
Oct	5,541.30	8,835	39	18	0	0	18	0	96	114	153
Nov	5,541.22	8,796	-39	18	0	0	18	0	77	95	56
Dec	5,542.20	9,276	480	18	0	0	18	0	34	52	532
Total	---	---	-5,784	464	4,988	470	5,922	0	2,231	8,153	2,369
Lake Davis			Capacity 84,371 acre-feet								
Jan	5,761.11	38,444	-570	615	12	0	627	0	163	790	220
Feb	5,761.42	39,274	830	575	8	0	583	0	180	763	1,593
Mar	5,761.70	40,008	734	615	8	0	623	0	450	1,073	1,807
Apr	5,761.37	39,143	-865	451	30	83	564	0	1,131	1,695	830
May	5,760.67	37,347	-1,796	246	73	369	688	0	1,197	1,885	89
Jun	5,759.89	35,405	-1,942	238	77	357	672	0	1,527	2,199	257
Jul	5,759.06	33,409	-1,996	246	80	369	695	0	1,415	2,110	114
Aug	5,758.17	31,349	-2,060	246	82	369	697	0	1,474	2,171	111
Sep	5,757.39	29,611	-1,738	595	62	0	657	0	1,105	1,762	24
Oct	5,757.11	29,003	-608	615	34	0	649	0	520	1,169	561
Nov	5,756.71	28,147	-856	595	9	0	604	0	351	955	99
Dec	5,757.18	29,154	1,007	615	10	0	625	0	235	860	1,867
Total	---	---	-9,860	5,652	485	1,547	7,684	0	9,748	17,432	7,572

* At end of month.

Table 8. Lake Oroville Monthly Operation

(in acre-feet except as noted) Capacity 3,537,577 acre-feet

Month	Year	Water Surface Elevation (in feet)	Storage	End-Of-Month Storage Change	Outflow						Hyatt Pumpback	Computed Inflow 3/
					Hyatt Generation 1/	Palermo Canal	Spillway Leakage 2/	Evap-oration	Spill	Total Outflow		
Jan	1992	702.96	1,277,365	11,631	70,163	130	0	355	0	70,648	0	82,279
	1991	651.48	921,058	-66,036	113,451	180	0	602	0	114,233	0	48,197
Feb	1992	734.35	1,535,990	258,625	41,902	116	0	685	0	42,703	2,335	298,993
	1991	654.21	937,977	16,919	44,896	164	0	849	0	45,909	0	62,828
Mar	1992	760.25	1,775,113	239,123	106,141	120	0	1,330	0	107,591	73,056	273,658
	1991	708.45	1,320,262	382,285	37,883	22	0	723	0	38,628	19	420,894
Apr	1992	784.10	2,017,514	242,401	41,903	132	0	2,510	0	44,545	16,408	270,538
	1991	741.50	1,599,577	279,315	35,000	0	0	1,925	0	36,925	13,171	303,069
May	1992	770.78	1,879,385	-138,129	258,633	830	0	4,504	0	263,967	12,287	113,551
	1991	750.76	1,684,654	85,077	230,141	714	0	2,684	0	233,539	52,617	265,999
Jun	1992	757.31	1,746,733	-132,652	223,863	959	0	4,376	0	229,198	41,666	54,880
	1991	738.23	1,570,271	-114,383	297,013	881	0	4,411	0	302,305	74,293	113,629
Jul	1992	737.40	1,562,896	-183,837	266,145	984	0	5,022	0	272,151	19,526	68,788
	1991	724.31	1,449,685	-120,586	262,101	982	0	5,025	0	268,108	42,270	105,252
Aug	1992	719.09	1,406,168	-156,728	228,699	1,060	0	5,147	0	234,906	0	78,178
	1991	716.89	1,388,101	-61,584	147,556	994	0	4,302	0	152,852	0	91,268
Sep	1992	708.02	1,316,867	-89,301	191,654	1,043	0	4,000	0	196,697	168	107,228
	1991	718.25	1,399,251	11,150	113,083	1,029	0	4,359	0	118,471	0	129,621
Oct	1992	706.60	1,305,700	-11,167	123,536	772	0	2,613	0	126,921	0	115,754
	1991	712.61	1,353,409	-45,842	117,563	845	0	3,428	0	121,836	0	75,994
Nov	1992	705.12	1,294,128	-11,572	89,148	241	0	1,094	0	90,483	0	78,911
	1991	709.81	1,331,037	-22,372	82,671	281	0	1,195	0	84,147	0	61,775
Dec	1992	718.59	1,402,048	107,920	98,151	164	0	535	0	98,850	0	206,770
	1991	701.45	1,265,734	-65,303	138,999	220	0	619	0	139,838	0	74,535
Total	1992	- - -	- - -	136,314	1,739,938	6,551	0	32,171	0	1,778,660	165,446	1,749,528
	1991	- - -	- - -	278,640	1,620,357	6,312	0	30,122	0	1,656,791	182,370	1,753,061

1/ Includes bypass flows

2/ Only occurs when lake water elevation is greater than or equal to 813.00 and there is no spill.

3/ Does not include pumpback.

Table 9. Thermalito Forebay Monthly Operation

Including Diversion Pool and Power Canal

(end-of-month storage in acre-feet)

Month	Year	Storage 1/	Storage Change	Inflow			Outflow					Losses and Gains
				Lake Oroville Release 2/	Kelly Ridge Generation	Thermalito Pumpback	Thermalito Generation 3/	County of Butte	Thermalito Irrigation District	Releases to River 4/	Hyatt Pumpback	
Jan	1992	24,438	-127	113,451	7,676	0	40,947	12	91	38,220	0	-41,984
	1991	20,470	-3,870	188,435	1,471	0	80,658	2	104	38,085	0	-74,927
Feb	1992	23,540	-898	44,896	10,200	21,992	40,325	35	77	36,030	2,335	816
	1991	22,433	1,963	125,957	1,290	72,010	79,886	27	94	34,612	0	-82,675
Mar	1992	23,425	-115	37,883	15,624	95,992	108,524	16	92	38,040	73,056	70,114
	1991	24,170	1,737	163,853	12,712	63,238	84,084	167	82	38,833	19	-114,881
Apr	1992	24,658	1,233	35,000	14,886	19,461	20,943	1	125	36,800	16,408	6,163
	1991	22,756	-1,414	451,613	14,180	65,801	67,368	125	119	37,133	13,171	-415,092
May	1992	23,669	-989	230,141	15,491	16,951	232,237	0	291	38,130	12,287	19,373
	1991	23,901	1,145	318,181	14,720	69,065	227,373	0	193	38,486	52,617	-82,152
Jun	1992	23,925	256	297,013	14,938	56,098	204,782	0	284	37,540	41,666	-83,521
	1991	22,659	-1,242	239,926	14,454	97,414	307,126	0	253	37,129	74,293	65,765
Jul	1992	24,418	493	262,101	15,479	30,749	232,331	0	330	47,670	19,526	-7,979
	1991	24,385	1,726	350,998	14,747	48,124	246,683	0	303	37,712	42,270	-85,175
Aug	1992	24,414	-4	147,556	10,365	0	188,429	0	321	37,060	0	67,885
	1991	23,775	-610	347,002	14,585	0	126,770	0	290	38,528	0	-196,609
Sep	1992	23,458	-956	113,083	452	0	155,893	0	292	37,100	168	78,962
	1991	23,862	87	113,895	4,123	0	79,673	0	263	37,306	0	-689
Oct	1992	23,615	157	117,563	467	0	78,441	5	209	37,920	0	-1,298
	1991	24,611	749	98,987	741	0	79,962	0	208	41,489	0	22,680
Nov	1992	24,590	975	82,671	8,585	0	54,478	0	106	36,570	0	873
	1991	24,915	304	93,327	14,833	0	60,243	0	117	37,076	0	-10,420
Dec	1992	24,955	365	138,999	10,391	0	70,976	48	97	37,940	0	-39,964
	1991	24,565	-350	257,633	1,971	0	109,033	7	98	38,389	0	-112,427
Total	1992		390	1,620,357	124,555	241,243	1,428,306	117	2,315	459,020	165,446	69,439
	1991		225	2,749,807	109,827	415,652	1,548,859	328	2,124	454,778	182,370	-1,086,602

1/ Sum of Thermalito Forebay and Diversion Pool.

2/ Sum of releases from Lake Oroville through Hyatt plant, spill, and spillway leakage.

3/ Includes bypass flows.

4/ Sum of Diversion Dam generation plus hatchery.

Table 10. Thermalito Afterbay Monthly Operation

(end-of-month storage in acre-feet)

Month	Year	Elevation (in feet)	Storage	Storage Change	Inflow	Outflow						Losses and Gains
					Thermalito Generation 1/	Sutter Butte Canal	Western Canal Lateral	Richvale Canal	Western Canal	River Outlet	Thermalito Pumpback	
Jan	1992	132.49	40,924	12,330	40,947	791	0	411	0	26,523	0	-892
	1991	133.82	46,011	12,923	80,658	902	0	290	234	65,156	0	-1,153
Feb	1992	132.25	40,036	-888	40,325	0	0	0	0	23,011	21,992	3,790
	1991	129.49	30,478	-15,533	79,886	5,179	0	0	0	20,103	72,010	1,873
Mar	1992	131.80	38,394	-1,642	108,524	0	0	0	0	14,674	95,992	500
	1991	132.15	39,668	9,190	84,084	0	0	0	0	14,966	63,238	3,310
Apr	1992	126.38	21,196	-17,198	20,943	5,170	0	1,340	1,530	12,296	19,461	1,656
	1991	124.98	17,531	-22,137	67,368	4,059	128	1,336	1,462	14,923	65,801	-1,796
May	1992	128.74	28,093	6,897	232,237	63,020	713	10,140	49,910	90,555	16,951	5,949
	1991	129.05	29,067	11,536	227,373	51,464	441	6,395	33,969	49,893	69,065	-4,610
Jun	1992	127.82	25,294	-2,799	204,782	49,150	549	8,980	36,230	63,401	56,098	6,827
	1991	125.81	19,667	-9,400	307,126	49,911	587	7,664	36,816	118,613	97,414	-5,521
Jul	1992	130.44	33,629	8,335	232,331	57,810	652	11,120	35,900	94,027	30,749	6,262
	1991	132.40	40,590	20,923	246,683	51,303	598	8,585	35,098	78,094	48,124	-3,958
Aug	1992	126.25	20,843	-12,786	188,429	54,330	499	11,700	30,560	112,922	0	8,796
	1991	133.49	44,723	4,133	126,770	47,687	527	8,021	33,063	29,522	0	-3,816
Sep	1992	128.82	28,343	7,500	155,893	26,700	47	2,010	4,630	112,230	0	-2,776
	1991	129.60	30,835	-13,888	79,673	24,645	82	2,631	8,930	54,015	0	-3,259
Oct	1992	126.94	22,748	-5,595	78,441	21,930	0	3,100	12,530	53,421	0	6,945
	1991	129.70	31,162	327	79,962	10,737	0	62	11,588	55,643	0	-1,605
Nov	1992	128.12	26,191	3,443	54,478	14,670	165	4,410	12,808	23,748	0	4,766
	1991	129.40	30,187	-975	60,243	12,936	209	6,827	16,112	25,020	0	-114
Dec	1992	132.68	41,634	15,443	70,976	13,600	73	3,410	6,740	34,269	0	2,559
	1991	128.90	28,594	-1,593	109,033	10,312	68	5,500	9,477	84,360	0	-908
Total	1992			13,040	1,428,306	307,171	2,698	56,621	190,838	661,077	241,243	44,382
	1991			-4,494	1,548,859	269,135	2,640	47,312	186,749	610,309	415,652	-21,557

1/ Includes bypass flows.

Table 11. Lake Del Valle Monthly Operation

1992

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage*	Storage Change	Inflow		Outflow					Precipitation (inches)
				Natural 1/	From South Bay Aqueduct	To Arroyo Valle	To South Bay Aqueduct	Recreation Deliveries	Total Releases	Evaporation Losses	
Jan	679.04	25,296	301	337	0	0	0	6	6	-30	1.53
Feb	694.98	34,489	9,193	10,006	270	268	755	6	1,029	-54	5.21
Mar	696.62	35,557	1,068	2,088	988	1,374	529	6	1,909	-99	1.97
Apr	702.31	39,428	3,871	64	4,052	22	0	9	31	-214	0.42
May	704.64	41,085	1,657	-6	2,024	0	0	11	11	-350	0.00
Jun	703.99	40,618	-467	-101	0	0	0	26	26	-340	0.10
Jul	700.96	38,488	-2,130	22	0	22	1,672	26	1,720	-432	0.00
Aug	700.22	37,978	-510	-13	0	0	0	22	22	-475	0.00
Sep	691.83	32,500	-5,478	190	0	177	5,118	24	5,319	-349	0.00
Oct	681.09	26,349	-6,151	109	0	109	5,941	1	6,051	-209	0.82
Nov	678.39	24,971	-1,378	-7	0	0	1,259	8	1,267	-104	0.20
Dec	680.27	25,922	951	994	0	0	0	2	2	-41	5.27
Total	---	---	927	13,683	7,334	1,972	15,274	147	17,393	-2,697	15.52

*At end of month.

1/ To East Bay Regional Park District.

Table 12. Clifton Court Forebay Monthly Operation

(elevation in feet, storage in acre-feet)

Month	Year	End-of-Month Water Surface Elevation (ft)	End-of-Month Storage (AF)	Storage Change (AF)	Inflow (AF)
Jan	1992	-0.16	17,919	4,576	189,886
	1991	-0.29	17,639	-2,607	177,349
Feb	1992	0.45	19,233	1,314	203,039
	1991	0.17	18,629	990	99,636
Mar	1992	0.21	18,715	-518	385,444
	1991	0.55	19,448	819	364,784
Apr	1992	0.12	18,522	-193	74,127
	1991	0.05	18,371	-1,077	271,296
May	1992	-0.20	17,833	-689	50,134
	1991	-0.12	18,005	-366	84,133
Jun	1992	0.41	19,146	1,313	65,857
	1991	0.11	18,500	495	58,579
Jul	1992	1.68	21,887	2,741	32,793
	1991	1.18	20,807	2,307	53,469
Aug	1992	1.72	21,973	86	97,162
	1991	-0.42	17,359	-3,448	127,928
Sep	1992	0.52	19,383	-2,590	166,192
	1991	-0.23	17,768	409	136,091
Oct	1992	2.09	22,773	3,390	47,029
	1991	0.81	20,009	2,241	211,911
Nov	1992	0.07	18,414	-4,359	62,485
	1991	-0.01	18,242	-1,767	61,647
Dec	1992	-0.31	17,596	-818	168,570
	1991	-2.29	13,343	-4,899	73,185
Total	1992	---	---	4,253	1,542,718
	1991	---	---	-6,903	1,720,008

Table 13. San Luis Reservoir Monthly Operation

(in acre-feet except as noted)

Month	Year	Reservoir Storage*			Inflow	Outflow			Gain (+) Loss (-)	Evaporatior	Precipitatior (in inches)
		Water Surface Elevatior (in feet)	Storage	Storage Change	Gianelli P-G Plant Pumping	Gianelli P-G Plant Generatior	Pacheco Tunnel	Spill			
Jan	1992	463.22	1,106,234	295,929	311,791	1,469	4,039	0	-10,354	1,097	0.30
	1991	410.75	610,943	131,465	152,419	0	7,934	0	-13,020	1,416	1.13
Feb	1992	489.90	1,393,332	287,098	298,286	2,208	2,748	0	-6,232	1,724	1.87
	1991	418.96	681,574	70,631	93,770	19,865	4,424	0	1,150	2,251	1.29
Mar	1992	532.78	1,899,427	506,095	536,905	0	8,425	0	-22,385	2,410	4.64
	1991	472.31	1,201,565	519,991	529,074	0	1,037	0	-8,046	4,649	0.57
Apr	1992	529.19	1,855,018	-44,409	93,837	119,732	15,616	0	-2,898	6,327	0.45
	1991	503.00	1,542,231	340,666	367,007	7,279	3,270	0	-15,792	8,317	0.04
May	1992	505.54	1,571,692	-283,326	0	270,639	11,925	0	-762	8,971	0.18
	1991	493.40	1,432,612	-109,619	16,798	117,591	5,401	0	-3,425	10,219	1.59
Jun	1992	464.72	1,121,789	-449,903	0	439,605	11,040	0	742	10,739	0.00
	1991	461.13	1,084,678	-347,934	8,267	347,727	7,371	0	-1,103	11,399	0.00
Jul	1992	418.46	677,191	-444,598	0	438,172	10,808	0	4,382	11,316	0.00
	1991	423.99	726,263	-358,415	5,332	361,013	7,520	0	4,786	11,681	0.00
Aug	1992	385.64	413,450	-263,741	27,983	284,805	7,269	0	350	7,888	0.07
	1991	405.32	569,441	-156,822	59,287	204,169	7,111	0	-4,829	8,555	0.00
Sep	1992	394.11	476,863	63,413	78,095	3,991	5,864	0	-4,827	7,230	0.00
	1991	415.76	653,701	84,260	116,145	17,006	3,953	0	-10,926	6,423	0.08
Oct	1992	378.53	362,822	-114,041	4,096	111,763	5,583	0	-791	5,154	0.27
	1991	425.61	740,880	87,179	123,023	26,404	3,269	0	-6,171	4,299	0.02
Nov	1992	381.11	380,915	18,093	49,066	23,730	2,095	0	-5,148	2,521	0.26
	1991	428.11	763,599	22,719	59,697	30,560	3,472	0	-2,946	1,956	0.13
Dec	1992	400.19	524,416	143,501	163,093	9,429	4,880	0	-5,283	1,196	1.28
	1991	433.17	810,305	46,706	80,336	28,396	3,660	0	-1,574	567	0.43
Total	1992	---	---	-285,889	1,563,152	1,705,543	90,292	0	-53,206	66,573	9.32
	1991	---	---	330,827	1,611,155	1,160,010	58,422	0	-61,896	71,732	5.28

* At end of month.

Table 14. O'Neill Forebay Monthly Operation

(in acre-feet except as noted)

Month	Year	End-of-Month Water Surface Elevation (in feet)	End-of-Month Storage	End-of-Month Storage Change	Inflow			Outflow				Gain (+) Loss (-)
					O'Neill P-G Plant Pumping	Gianelli P-G Plant Generation	Flow Past Check 12	O'Neill P-G Plant Generation	Gianelli P-G Plant Pumping	Dos Amigos Pumping Plant Pumping	Deliveries	
Jan	1992	221.80	47,861	-499	185,466	1,469	179,048	0	311,791	56,678	356	2,343
	1991	220.05	43,282	-6,511	89,853	0	162,508	3,541	152,419	111,711	375	9,174
Feb	1992	223.45	52,250	4,389	112,902	2,208	199,006	1,439	298,286	16,150	272	6,420
	1991	220.38	44,140	858	85,201	19,865	83,004	2,455	93,770	88,873	702	-1,412
Mar	1992	222.23	48,995	-3,255	187,194	0	382,586	0	536,905	54,767	107	18,744
	1991	219.66	42,273	-1,867	191,893	0	358,182	1,271	529,074	22,131	213	747
Apr	1992	223.49	52,357	3,362	60,914	119,732	59,968	27,820	93,837	118,115	1,142	3,662
	1991	218.57	39,498	-2,775	128,033	7,279	259,901	8,457	367,007	29,335	871	7,682
May	1992	219.29	41,323	-11,034	0	270,639	31,946	68,824	0	244,401	1,493	1,099
	1991	220.43	44,270	4,772	11,770	117,591	60,780	35,466	16,799	135,965	1,395	4,256
Jun	1992	223.41	52,142	10,819	0	439,605	45,920	111,751	0	376,394	1,940	15,379
	1991	220.62	44,766	496	0	347,727	32,848	106,644	8,267	270,633	1,675	7,140
Jul	1992	221.83	47,940	-4,202	0	438,172	12,462	124,260	0	345,713	2,306	17,443
	1991	220.50	44,453	-313	0	361,013	26,126	108,102	5,332	274,984	2,344	3,310
Aug	1992	219.61	42,145	-5,795	1,688	284,805	72,806	88,471	27,983	260,323	2,137	13,820
	1991	223.66	52,813	8,360	1,932	204,169	108,100	69,631	59,287	182,096	2,052	7,225
Sep	1992	221.70	47,598	5,453	32,578	3,991	154,828	1,437	78,095	112,400	803	6,791
	1991	222.42	49,501	-3,312	37,185	17,006	115,900	3,854	116,145	58,158	592	5,346
Oct	1992	220.85	45,368	-2,230	2,793	111,763	33,298	48,848	4,096	104,815	427	8,102
	1991	221.40	46,810	-2,691	17,277	26,404	193,392	25,282	123,023	93,083	460	2,084
Nov	1992	220.02	43,204	-2,164	38,805	23,730	54,439	4,515	49,066	68,415	333	3,191
	1991	220.93	45,577	-1,233	60,615	30,560	51,400	2,152	59,697	79,690	93	-2,176
Dec	1992	222.41	49,474	6,270	69,634	9,429	159,225	790	163,093	68,944	119	928
	1991	221.99	48,360	2,783	102,085	28,396	66,263	0	80,336	109,830	274	-3,521
Total	1992			1,114	691,974	1,705,543	1,385,532	478,155	1,563,152	1,827,115	11,435	97,922
	1991	---	---	-1,433	725,844	1,160,010	1,518,404	366,855	1,611,156	1,456,489	11,046	39,855

Table 15. Monthly Operations Summary, State-Federal San Luis Joint-Use Facilities
1992

(In acre-feet except as noted)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Check 12													
State	179,048	199,006	382,586	59,968	31,946	45,920	12,462	72,806	140,828	16,482	50,439	159,225	1,350,716
Federal	0	0	0	0	0	0	0	0	14,000	16,816	4,000	0	34,816
Total	179,048	199,006	382,586	59,968	31,946	45,920	12,462	72,806	154,828	33,298	54,439	159,225	1,385,532
O'Neill													
Pumping													
State	0	0	0	0	0	0	0	0	0	0	0	0	0
Federal	185,466	112,902	187,194	60,914	0	0	0	1,688	32,578	2,793	38,805	69,634	691,974
Total	185,466	112,902	187,194	60,914	0	0	0	1,688	32,578	2,793	38,805	69,634	691,974
Generation													
Federal	0	1,439	0	27,820	68,824	111,751	124,260	88,471	1,437	48,848	4,515	790	478,155
O'Neill Forebay													
Storage*													
State	22,582	29,143	19,870	34,319	18,776	8,353	494	-14,116	-2,357	9,337	11,273	21,457	xxxxxx
Federal	25,279	23,107	29,125	18,038	22,547	43,789	47,446	56,261	49,955	36,031	31,931	28,017	xxxxxx
Total	47,861	52,250	48,995	52,357	41,323	52,142	47,940	42,145	47,598	45,368	43,204	49,474	xxxxxx
San Luis Reservoir													
Storage*													
State	526,163	695,590	991,840	951,836	829,134	647,245	439,596	354,352	380,959	305,958	296,535	383,191	xxxxxx
Federal	580,071	697,742	907,587	903,182	742,558	474,544	237,595	59,098	95,904	56,864	84,380	141,225	xxxxxx
Total	1,106,234	1,393,332	1,899,427	1,855,018	1,571,692	1,121,789	677,191	413,450	476,863	362,822	380,915	524,416	xxxxxx
Gianelli													
Pumping													
State	134,433	177,063	308,562	35,454	0	0	0	27,983	58,507	4,096	11,397	98,991	856,486
Federal	177,358	121,223	228,343	58,383	0	0	0	0	19,588	0	37,669	64,102	706,666
Total	311,791	298,286	536,905	93,837	0	0	0	27,983	78,095	4,096	49,066	163,093	1,563,152
Generation													
State	1,469	2,208	0	65,128	122,283	182,297	197,599	113,420	2,245	70,762	17,989	9,429	784,829
Federal	0	0	0	54,604	148,356	257,308	240,573	171,385	1,746	41,001	5,741	0	920,714
Total	1,469	2,208	0	119,732	270,639	439,605	438,172	284,805	3,991	111,763	23,730	9,429	1,705,543
San Felipe Project													
Federal	4,039	2,748	8,425	15,616	11,925	11,040	10,808	7,269	5,864	5,583	2,095	4,880	90,292
Dos Amigos													
Pumping													
State	52,247	10,621	35,063	83,207	170,376	247,099	227,514	180,454	103,542	93,310	60,850	64,989	1,329,272
Federal	4,431	5,529	19,704	34,908	74,025	129,295	118,199	79,869	8,858	11,505	7,565	3,955	497,843
Total	56,678	16,150	54,767	118,115	244,401	376,394	345,713	260,323	112,400	104,815	68,415	68,944	1,827,115

*At end of month.

Table 16. Pyramid Lake Monthly Operation
1992

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Total Storage 1/	Natural Inflow Storage Shares	Storage Change	Inflow			Outflow				Computed Losses (-) Gains (+)
					Natural	Project Warne Power-Plant	LADWP Pumpback 2/	Angeles Tunnel	Recreation (Metered Water)	To Piru Creek Natural Inflow Release 3/	To Piru Creek Project Water for Fish Enhancement	
Jan	2,569.66	159,357	-110	15,076	1,393	46,088	105,751	135,744	0	1,503	0	-909
Feb	2,571.86	162,095	6,869	2,738	35,224	10,439	40,601	58,505	0	28,245	0	3,224
Mar	2,571.13	161,183	12,903	-912	20,889	3,343	50,600	62,700	1	14,855	0	1,812
Apr	2,572.92	163,426	4/ 4,482	2,243	11,604	19,919	50,119	78,584	2	330	0	-483
May	2,575.49	166,681	8,545	3,255	4,907	43,962	18,434	61,943	3	844	0	-1,258
Jun	2,572.01	162,283	9,049	-4,398	1,684	48,301	30,527	81,065	5	1,180	0	-2,660
Jul	2,570.10	159,902	8,570	-2,381	1,091	31,181	61,452	92,384	5	1,570	0	-2,146
Aug	2,574.07	164,877	7,616	4,975	611	18,572	69,631	81,111	7	1,565	0	-1,156
Sep	2,569.20	158,788	6,719	-6,089	616	36,708	34,812	75,245	2	1,513	0	-1,465
Oct	2,573.63	164,321	4,529	5,533	607	41,690	58,927	90,782	2	2,797	0	-2,110
Nov	2,576.21	167,600	271	3,279	730	32,720	59,000	82,445	1	4,988	0	-1,737
Dec	2,571.16	161,221	458	-6,379	2,446	48,940	55,725	109,871	1	2,259	0	-1,359
Total	- - -	- - -	- - -	16,940	81,802	381,863	635,579	1,010,379	29	61,649	0	-10,247

1/ At end of month.

2/ Pumpback by Los Angeles Department of Water and Power (LADWP) from Elderberry Forbay through Castaic Powerplant.

3/ Portion of these amounts used to satisfy fish enhancement agreement.

4/ 19,695 AF appropriated by DWR on 4-15-92. 4,482 AF remained to be stored after 4-15-92.

Table 17. Elderberry Forebay Monthly Operation
1992

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Total Storage	Storage Change	Inflow		Outflow To Castaic Lake		Pumpback to Pyramid Lake 1/	Computed Losses (-) Gains (+)
				Castaic Powerplant Generation	Natural	Natural	Project		
Jan	1,521.75	24,302	-107	135,744	233	233	29,996	105,751	-104
Feb	1,520.90	23,942	-360	58,505	12,741	12,741	18,813	40,601	549
Mar	1,526.90	26,564	2,622	62,700	3,989	3,989	10,721	50,600	1,243
Apr	1,514.80	21,424	-5,140	78,584	2,449	2,449	32,088	50,119	-1,517
May	1,515.00	21,504	80	61,943	497	497	42,926	18,434	-503
Jun	1,516.10	21,947	443	81,065	103	103	50,304	30,527	209
Jul	1,526.15	26,228	4,281	92,384	8	8	25,526	61,452	-1,125
Aug	1,508.90	19,124	-7,104	81,111	0	0	17,880	69,631	-704
Sep	1,524.45	25,474	6,350	75,245	0	0	32,992	34,812	-1,091
Oct	1,512.82	20,638	-4,836	90,782	0	0	35,649	58,927	-1,042
Nov	1,507.18	18,476	-2,162	82,445	1	1	25,209	59,000	-398
Dec	1,514.53	21,316	2,840	109,871	297	297	51,207	55,725	-99
Total	- - -	- - -	-3,093	1,010,379	20,318	20,318	373,311	635,579	-4,582

1/ Pumpback by Los Angeles Department of Water and Power (LADWP) through Castaic Power Plant.

Table 18. Castaic Lake Monthly Operation
1992

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Total Storage 1/	Natural Inflow Storage Shares	Storage Change	Inflow			Outflow		Computed Losses (-) Gains (+)
					Natural	From Elderberry Forebay		Deliveries	Released to Castaic Lagoon	
						Natural	Project			
Jan	1,506.40	304,811	92	9,364	162	233	29,996	21,061	406	440
Feb	1,508.90	310,233	6,014	5,422	5,853	12,741	18,813	21,907	12,672	2,594
Mar	1,510.21	313,096	11,417	2,863	2,366	3,989	10,721	13,272	952	11
Apr	1,506.56	305,156	2/ 440	-7,940	1,252	2,449	32,088	39,146	3,224	-1,359
May	1,509.79	312,177	429	7,021	379	497	42,926	34,925	3/ 887	-969
Jun	1,507.61	307,428	349	-4,749	146	103	50,304	54,581	329	-392
Jul	1,502.78	297,059	107	-10,369	54	8	25,526	37,485	304	1,832
Aug	1,489.94	270,511	19	-26,548	7	0	17,880	43,788	95	-552
Sep	1,483.31	257,336	0	-13,175	6	0	32,992	47,525	382	1,734
Oct	1,473.25	238,029	33	-19,307	33	0	35,649	57,023	0	2,034
Nov	1,462.55	218,367	62	-19,662	28	1	25,209	43,683	0	-1,217
Dec	1,473.99	239,421	773	21,054	608	297	51,207	31,899	194	1,035
Total	- - -	- - -	- - -	-56,026	10,894	20,318	373,311	446,295	19,445	5,191

1/ At end of month.

2/ 11,454 AF appropriated by DWR as of 4-6-92. 440 AF inflow stored after 4-5-92.

3/ 15 AF inflow - MWD dewatered pipeline into afterbay

Table 19. Castaic Lagoon Monthly Operation
1992

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Total Storage	Storage Change	Inflow	Natural Outflow Release From Castaic Lagoon		Deliveries to Recreation
					Surface	Sub-Surface	
Jan	1133.10	5,101	192	406	0	187	27
Feb	1135.56	5,576	475	12,672	11,996	178	23
Mar	1136.36	5,733	157	952	580	186	29
Apr	1136.24	5,709	-24	3,224	3,052	180	16
May	1136.00	5,662	-47	1/ 887	667	186	81
Jun	1135.50	5,564	-98	329	127	180	120
Jul	1135.36	5,537	-27	304	24	186	121
Aug	1134.38	5,346	-191	95	0	137	149
Sep	1134.68	5,404	58	382	0	195	129
Oct	1133.50	5,177	-227	0	0	129	98
Nov	1132.28	4,946	-231	0	0	135	96
Dec	1133.44	5,166	220	2/ 240	0	59	20
Total	- - -	- - -	257	19,491	16,446	1,938	909

1/ +15 AF of water from dewatering of MWD pipeline included.

2/ Includes 46 AF from Lagoon tributaries.

Table 20. Silverwood Lake Monthly Operation

1992

(in acre-feet except as noted)

Month	Water Surface Elev. (in feet)	Storage	Natural Inflow Storage Shares 1/	Storage Change	Inflow		Outflow				Computed Losses (-) or Gains(+)	Natural Inflow Exchanged or Released 2/
					Natural	Project	San Bernardino Tunnel	Houston Creek Approp-riation	Deliveries to Mojave Water Agency	Natural Inflow to Mojave River		
Jan	3,352.93	72,964	147	1,015	688	10,590	9,547	76	2,045	173	1,578	747
Feb	3,351.23	71,340	1,967	-1,624	6,281	1,780	7,329	82	1	3,528	1,255	4,461
Mar	3,349.41	69,622	2,714	-1,718	8,325	5,390	9,389	91	2	6,353	402	7,578
Apr	3,346.32	66,758	3/ 978	-2,864	2,034	13,110	16,636	52	2	1,682	364	2,717
May	3,351.67	71,758	747	5,000	668	54,430	48,333	126	2,754	12	1,127	899
Jun	3,349.08	69,313	675	-2,445	229	35,910	40,531	121	653	18	2,739	301
Jul	3,347.93	68,242	568	-1,071	90	33,060	34,642	125	8	16	570	197
Aug	3,350.31	70,469	238	2,227	2	44,740	44,302	147	9	15	1,958	332
Sep	3,347.88	68,196	145	-2,273	26	37,160	42,202	134	8	15	2,900	119
Oct	3,348.05	68,354	159	158	29	30,910	34,298	128	640	15	4,300	15
Nov	3,349.62	69,819	165	1,465	50	20,410	18,405	81	2,998	15	2,504	44
Dec	3,344.54	65,138	1,238	-4,681	2,310	15,090	23,184	110	530	1,130	2,873	1,237
Total	- - -	- - -	- - -	-6,811	20,732	302,580	328,798	1,273	9,650	12,972	22,570	18,647

1/ Includes Los Flores and Houston Creek up through March 1992. April 1992 Houston Creek inflows deleted.

2/ Total releases made from Mojave Siphon to Las Flores Ranch Co., in exchange for natural inflow stored in lake, and from Silverwood Lake to Mojave River from outlet for Mojave W.A. The difference between this total column and the natural inflow released to Mojave River equals the Las Flores Ranch.

3/ 1,053 AF of natural inflow stored for CLAWA (Houston Creek) appropriated by DWR on 4-6-92.

Table 21. Lake Perris Monthly Operation
1992

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Total Storage	Storage Change	Inflow	Outflow	Computed Losses (-) Gains (+)
Jan	1,586.91	124,351	296	1,255	416	-543
Feb	1,587.22	125,058	707	728	390	369
Mar	1,587.82	126,429	1,371	1,660	410	121
Apr	1,585.29	120,687	-5,742	1,232	4,685	-2,289
May	1,584.70	119,363	-1,324	575	1,025	-874
Jun	1,584.13	118,089	-1,274	1,237	421	-2,090
Jul	1,584.28	118,424	335	1,001	593	-73
Aug	1,584.07	117,955	-469	1,080	461	-1,088
Sep	1,583.80	117,354	-601	1,233	426	-1,408
Oct	1,584.11	118,044	690	1,403	423	-290
Nov	1,583.57	116,842	-1,202	925	768	-1,359
Dec	1,582.74	115,004	-1,838	329	2,576	409
Total	---	---	-9,051	12,658	12,594	-9,115

Figure 1. Total Deliveries From SWP Facilities

Annual Totals

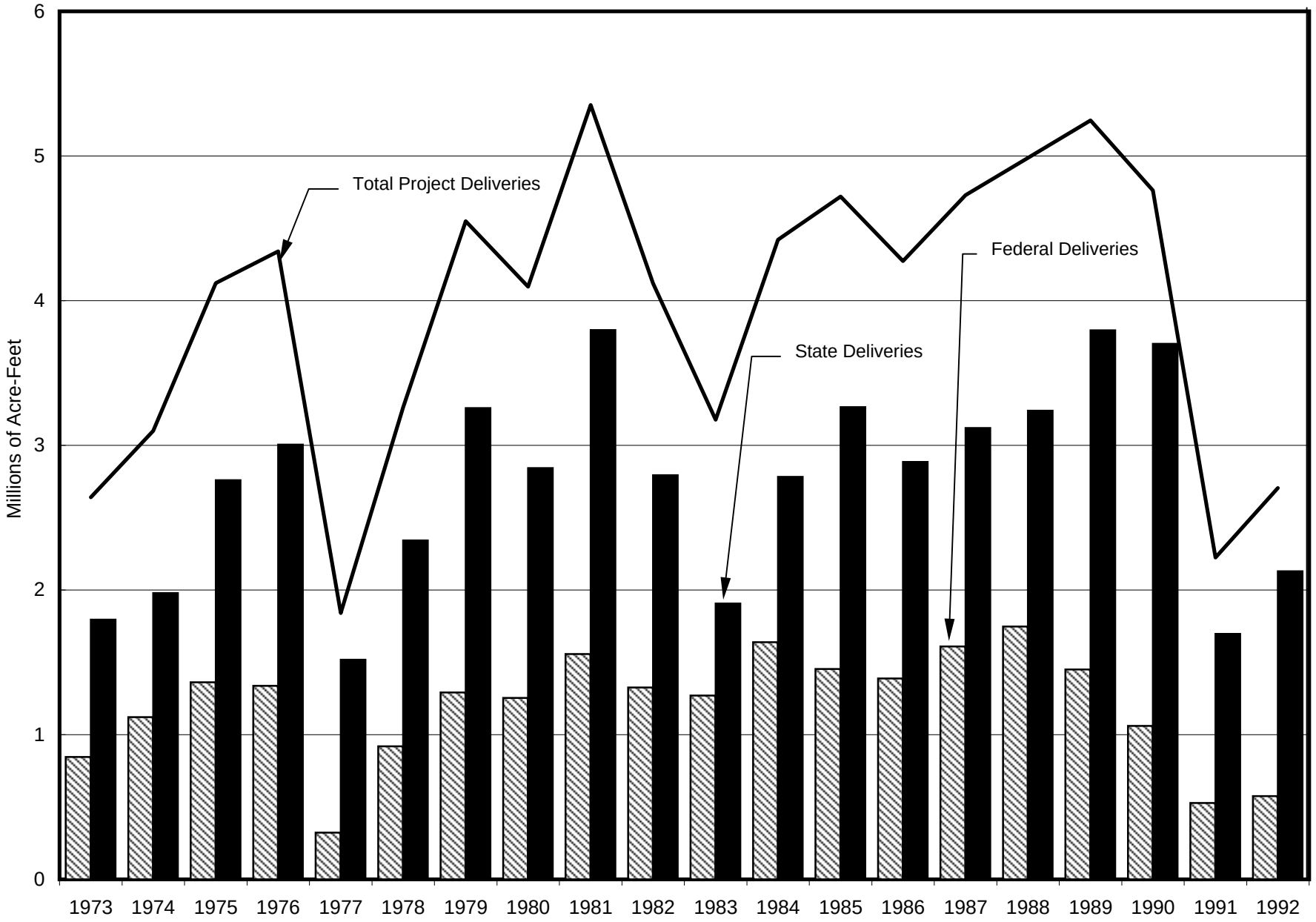
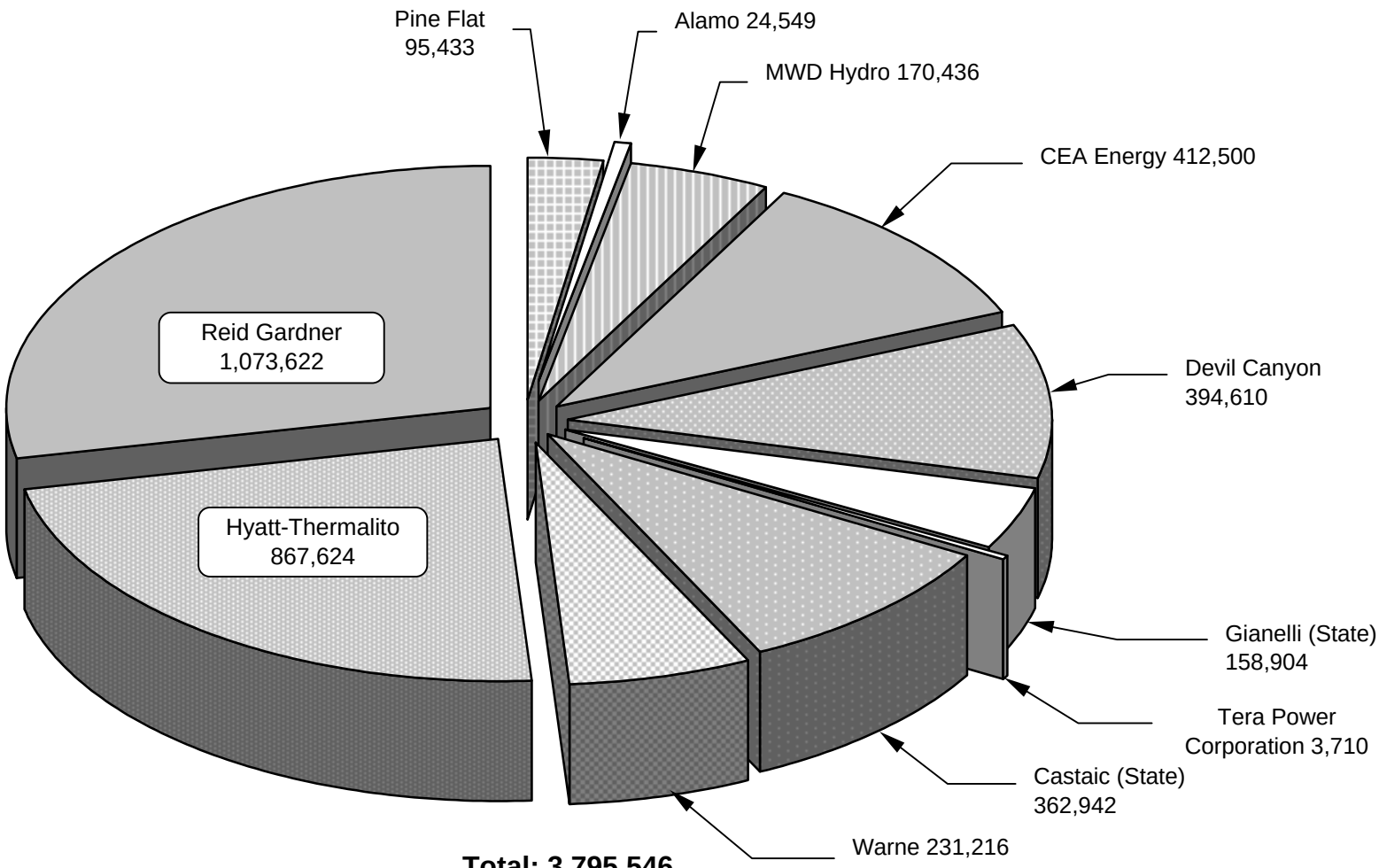


Figure 2. SWP Energy Resources

(all values in MWh)

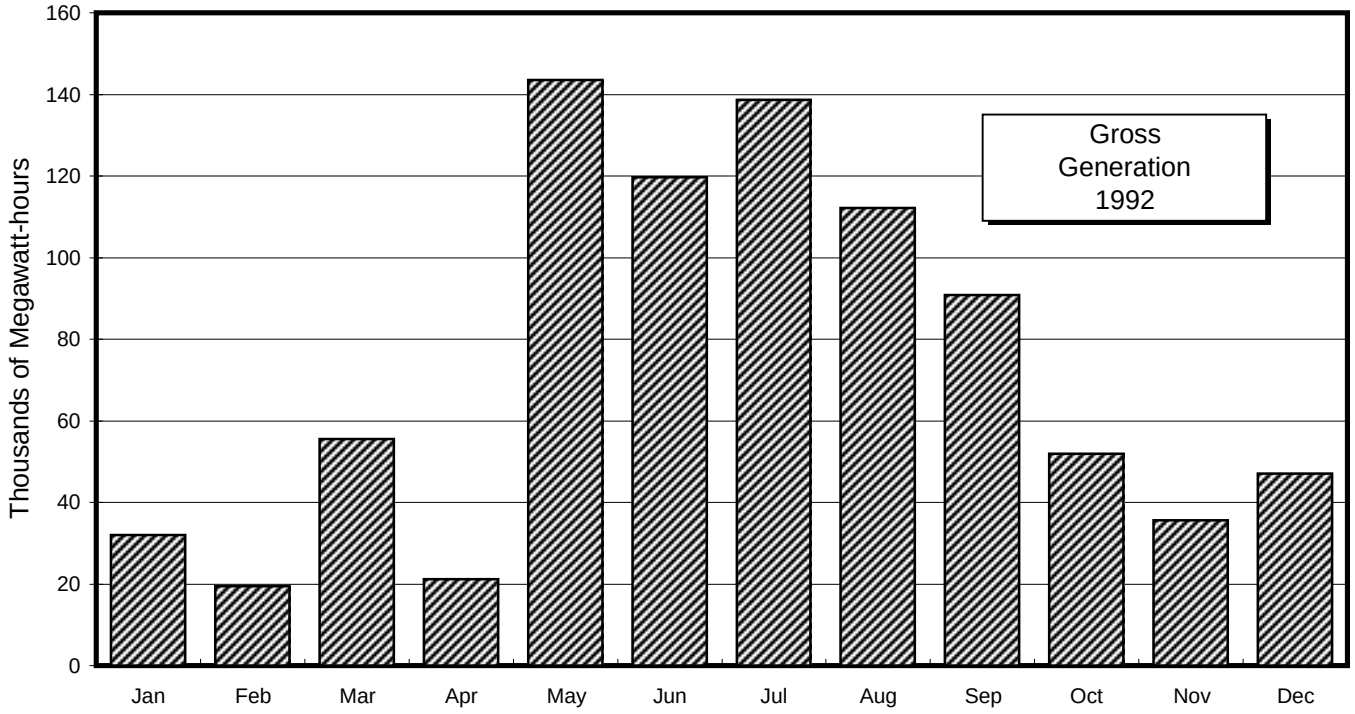
1992



Total: 3,795,546

Note: Purchases, Other Sources, and SCE Return Additional are not shown here. All values are metered readings at plants and are not adjusted for transmission losses.

Figure 3. Operation of Edward Hyatt and Thermalito Powerplants



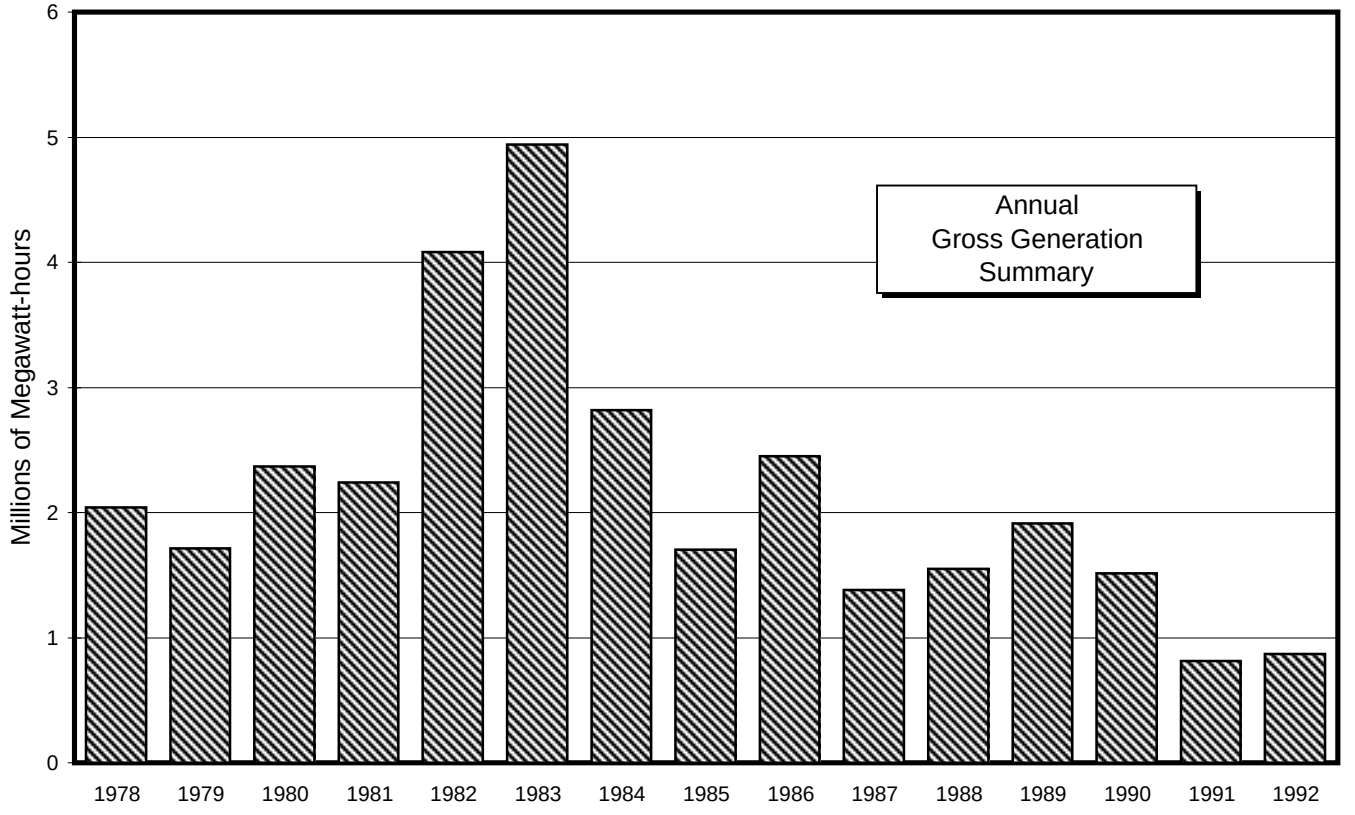
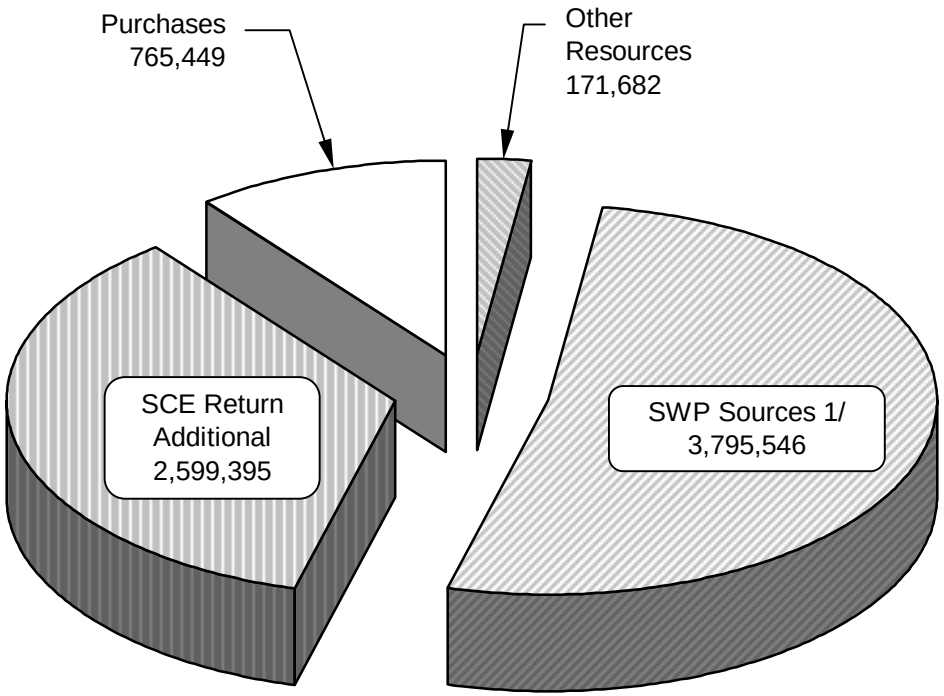


Figure 4. Energy Resources
(State Only)
(all values in MWh)
1992



Total: 7,332,072

1/ See Figure 2 for a breakdown of this source.

Purchases

Pacific Power and Light	623,497
Salt River Project	78,515
Portland General Electric	20,774
Bonneville Power Authority	13,094
Puget Sound Power and Light	11,350
British Columbia Hydro Authority	4,297
Washington Water and Power Co.	3,950
Eugene Water and Electric Board	2,915
Southern California Edison	2,420
Seattle City Light	2,200
Montana Power Company	1,775
Western Area Lower Colorado	660
Nevada Power	2
	765,449

Other Resources

Southern California Edison	67,835
Bonneville Power Authority	48,555
Pacific Gas and Electric	36,576
Northern California Power Agency	8,780
City of Vernon	3,979
Los Angeles Dept. of Water and Power	3,737
Western Area Mid Pacific	2,220
	171,682

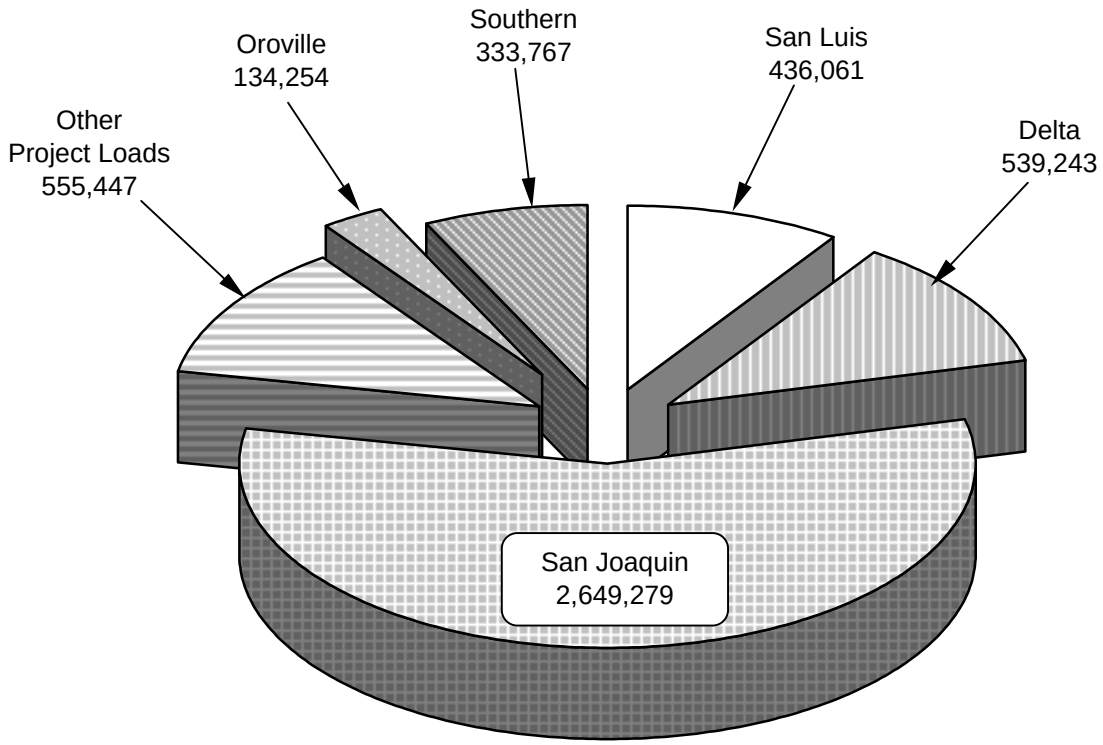
SCE Return Additional

Total Received from SCE	3,929,895
SCE Hyatt-Thermalito Entitlement	-286,212
SCE Hyatt-Thermalito Pump-back Credit	-42195
SCE Devil Canyon Entitlement	-394,608
SCE Alamo Entitlement	-24,549
SCE - CEA Entitlement	-412,500
MWD Hydro Entitlement	-170,436
	2,599,395

Figure 5. SWP Energy Loads

(all values in MWh)

1992



Total: 4,648,051

Oroville Field Division

Hyatt-Thermalito Complex (Pump-back and Station Service)	134,254

Delta Field Division

North Bay	18,975
South Bay	82,865
Del Valle	636
Banks	435,636
Bottle Rock (Station Service)	1,130

San Luis Field Division

Gianelli	260,329
Dos Amigos	173,901
Pine Flat (Station Service)	1,831

San Joaquin Field Division

Las Perillas	6,830
Badger Hill	17,803
Buena Vista	212,984
Teerink	221,536
Chrisman	491,760
Edmonston	1,698,366

Southern Field Division

Oso	104,494
Pearblossom	228,626
Warne (Station Service)	647

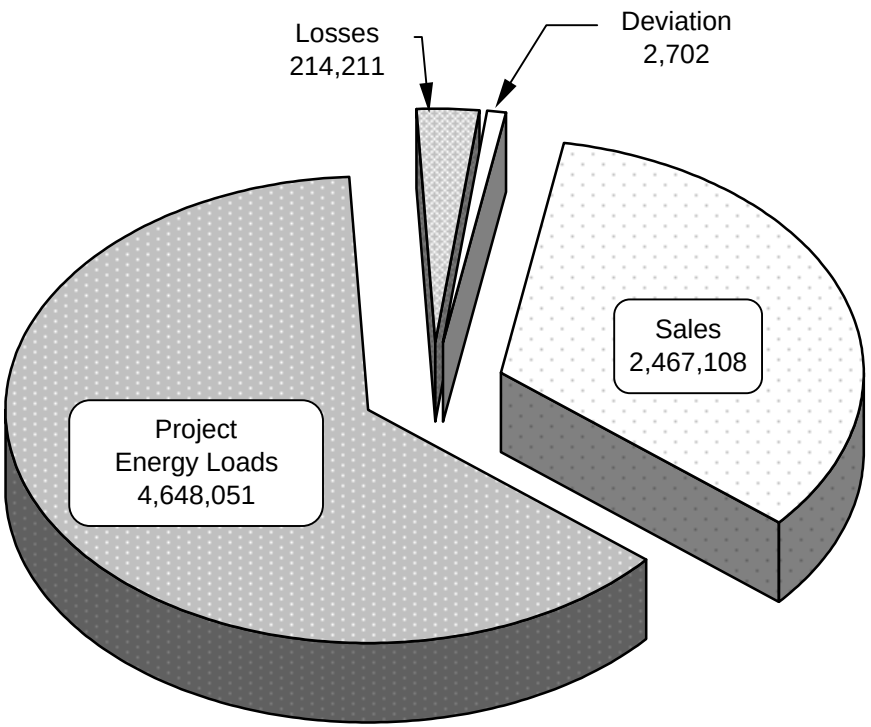
Other Project Loads

Southern California Edison	412,500
Bonneville Power Authority	82,380
Pacific Gas and Electric	43,070
Northern California Power Agency	6,180
Nevada Power	4,728
City of Vernon	3,979
Western Area Mid Pacific	2,392
South Bay Station Service	218

Figure 6. Total Energy Loads

(all values in MWh)

1992



Sales	
Sacramento Municipal Utility District	947,253
Modesto Irrigation District	349,834
Pacific Gas and Electric	289,718
City of Vernon	148,294
Turlock Irrigation District	141,432
Nevada Power	129,500
City and County of San Francisco	123,575
Bonneville Power Authority	117,294
Portland General Electric	110,030
Southern California Edison	42,734
Northern California Power Agency	35,811
Metropolitan Water District	22,621
City of Riverside	4,582
City of Anaheim	3,530
Salt River Project	900
Total	2,467,108

Total: 7,332,072

Note: See Figure 5 for breakdown of Project Energy Loads.

Figure 7. Antioch High-High Tide, Delta Inflow, and Outflow Index

1992

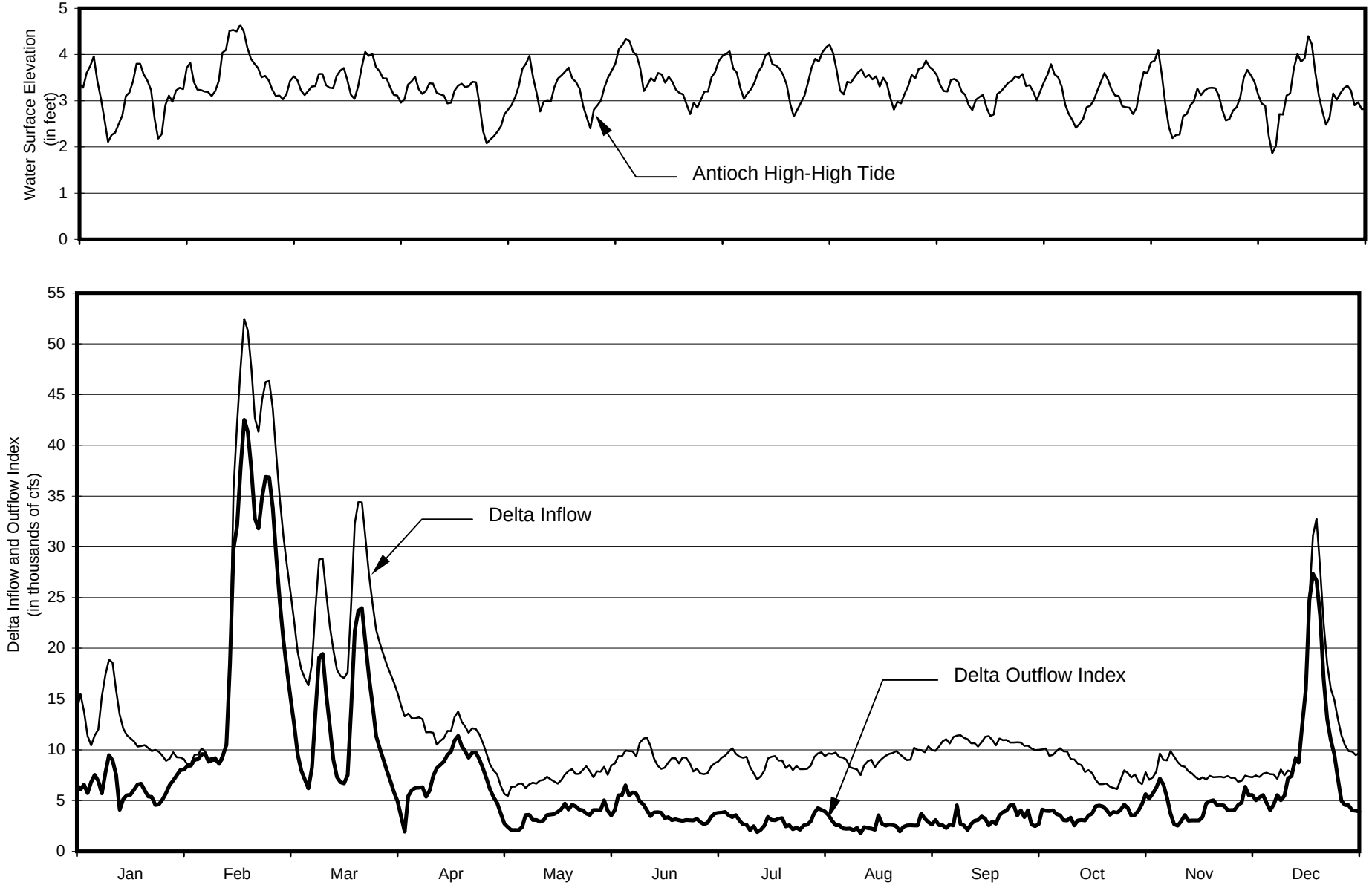
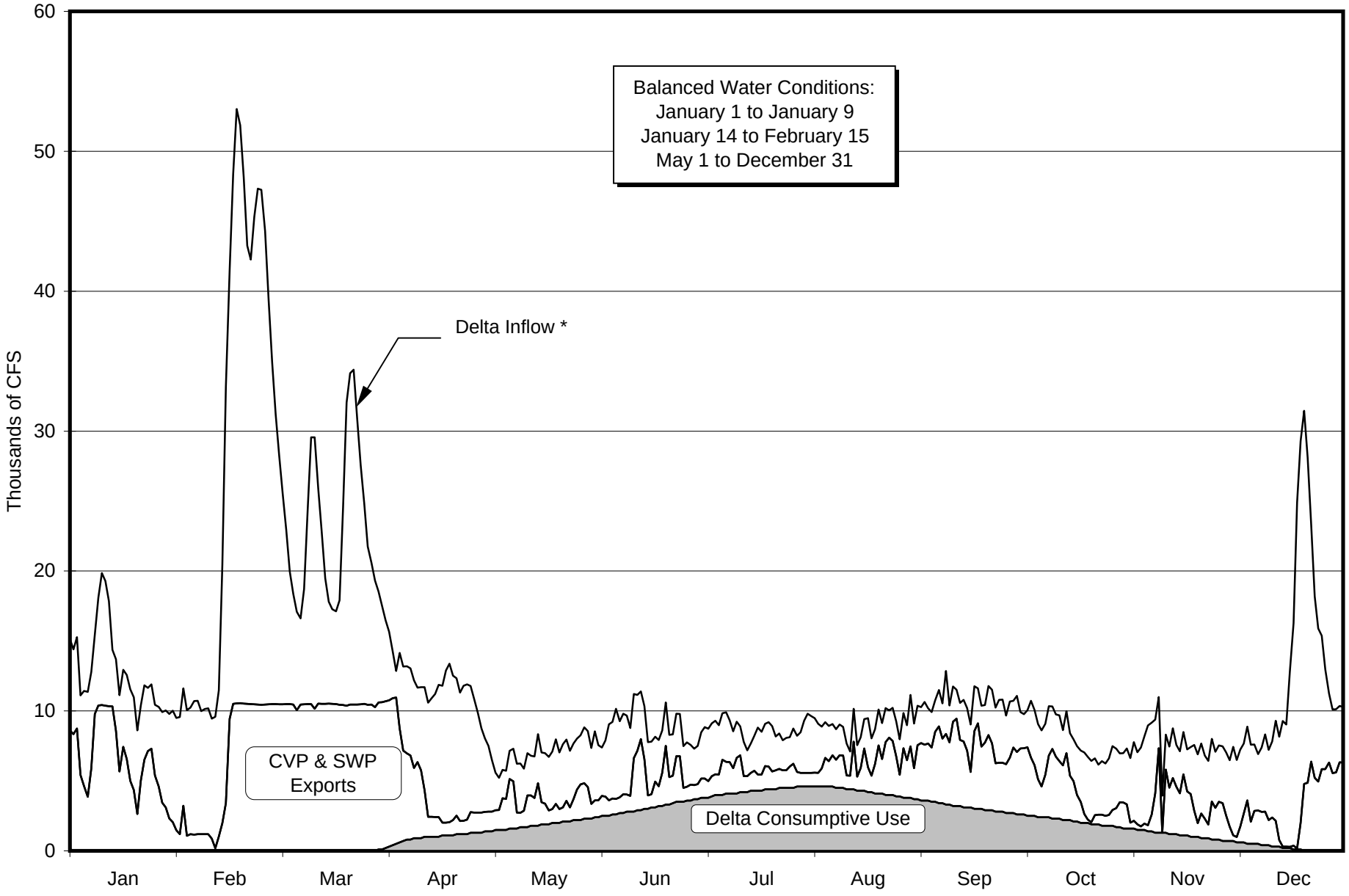


Figure 8. Coordinated Delta Operations
1992



* Delta Inflow = Exports + Outflow +Consumptive Use.

Figure 9. Coordinated Delta Operations
Lagged Storage Withdrawals
1992

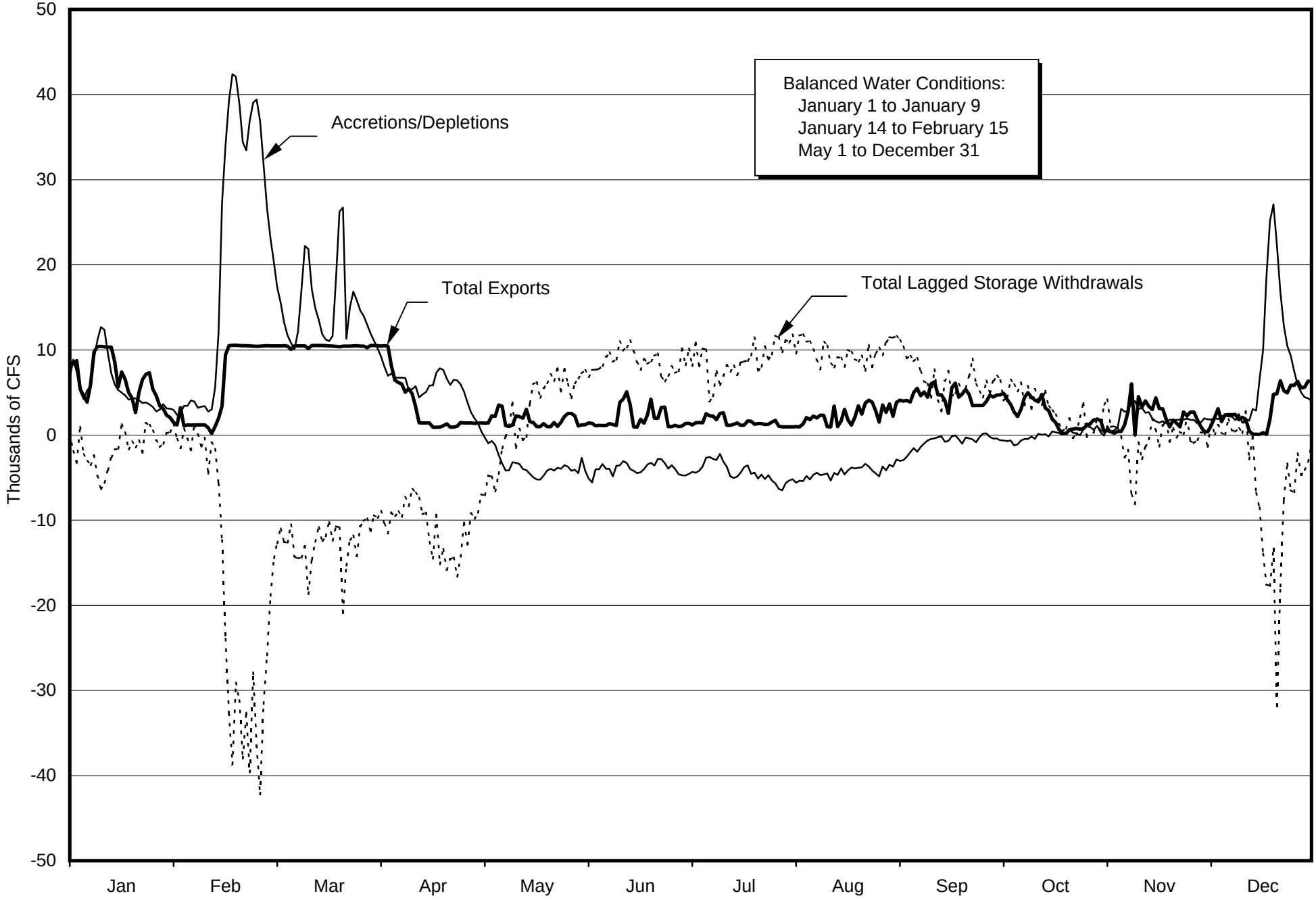


Figure 10. Coordinated Delta Operations
Delta Exports
1992

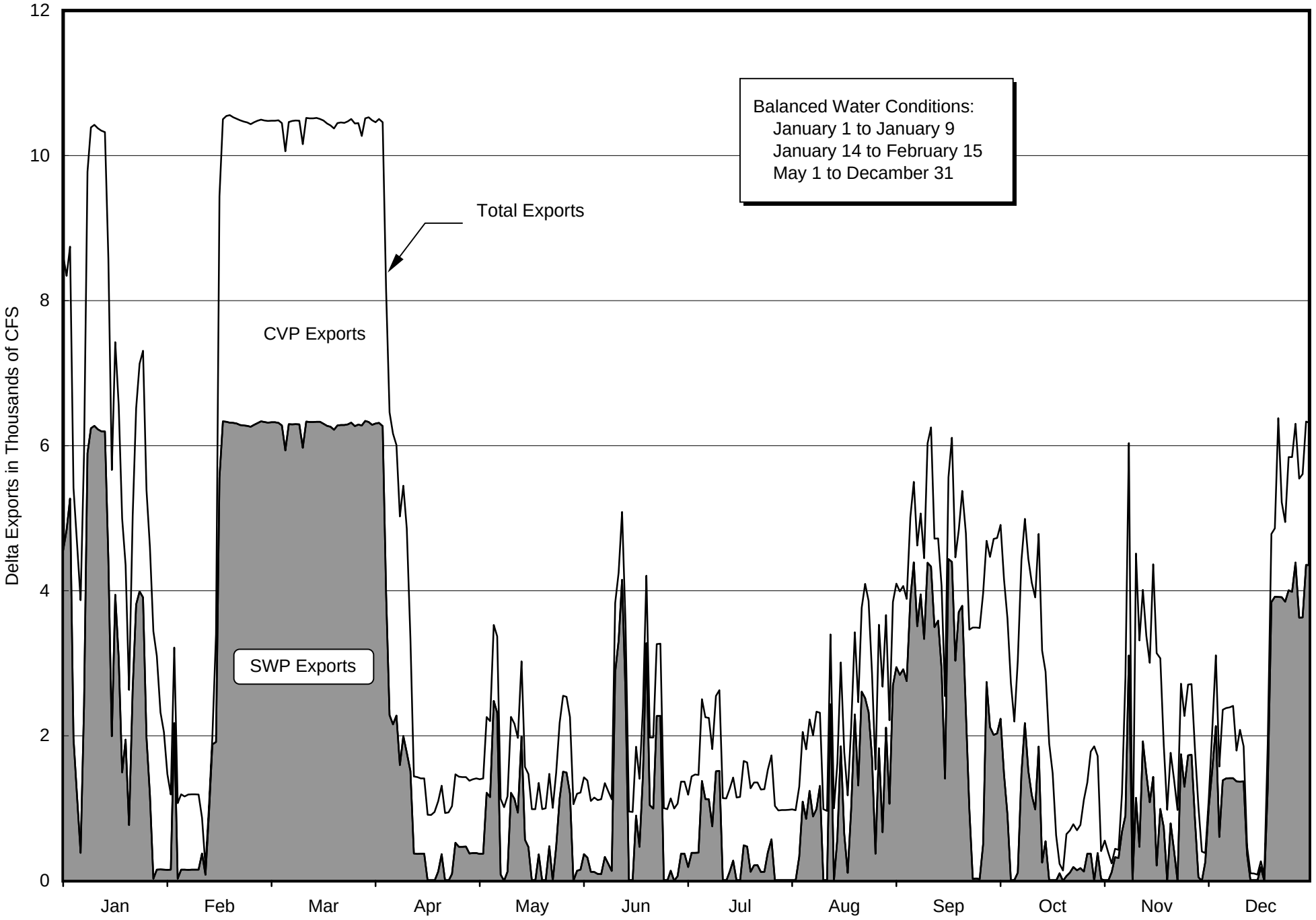
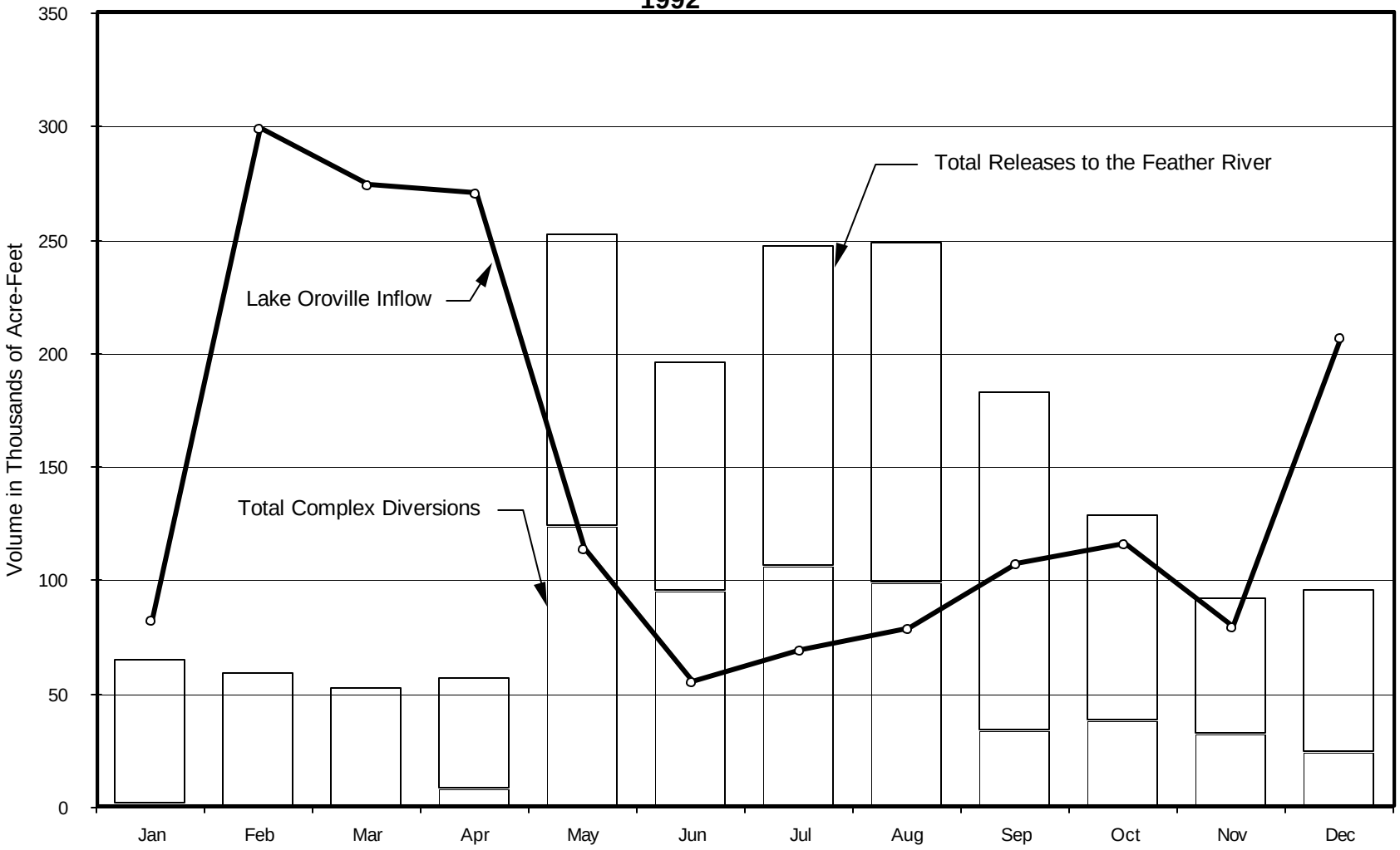


Figure 11. Oroville-Thermalito Complex

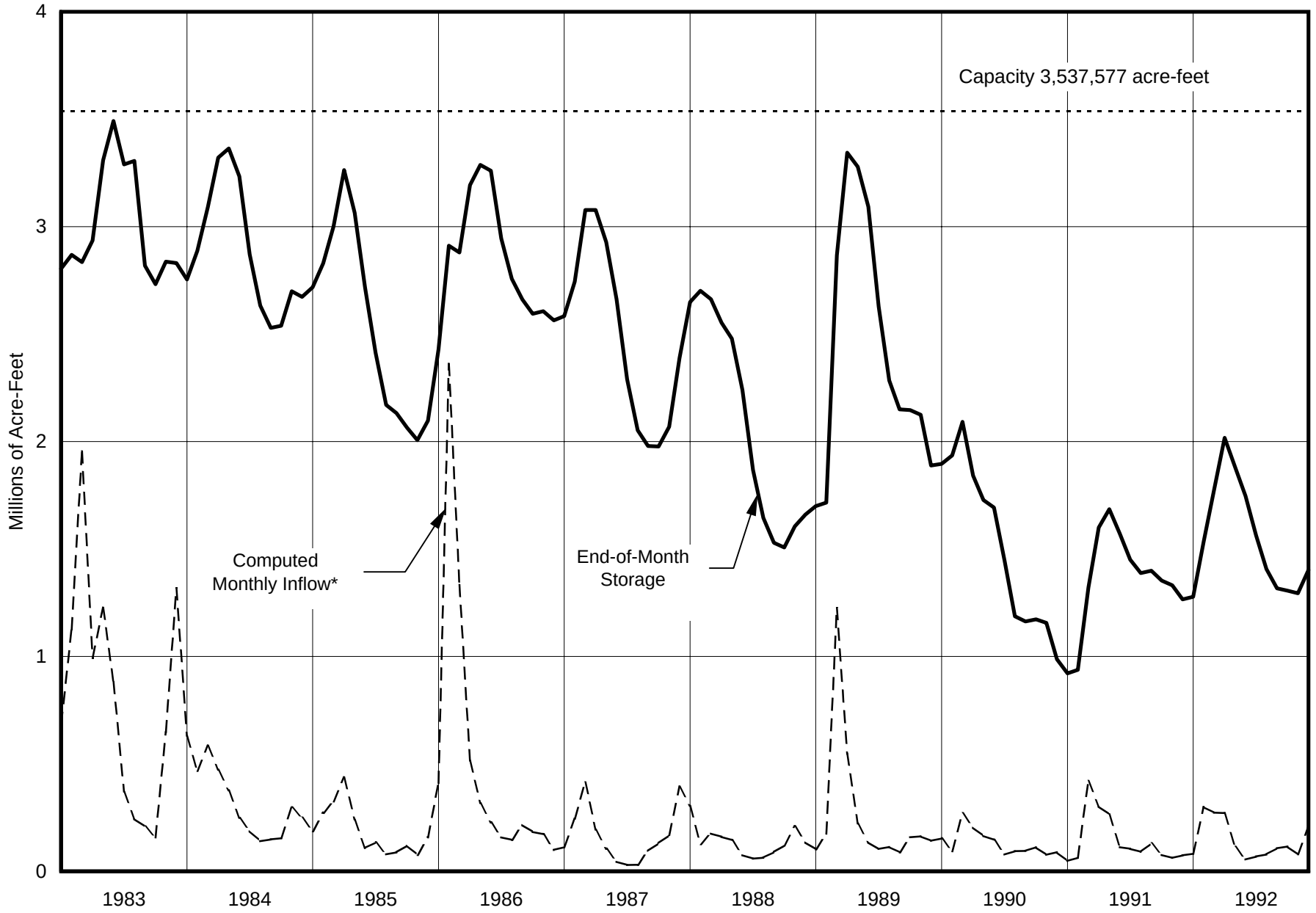
Inflow, Releases, and Diversions

1992



Note: Releases include flows at fish barrier dam, fish hatchery, and Afterbay river outlet. Diversions include Butte County, Thermalito Irrigation District, Sutter Butte Canal, Western Lateral, Richvale Canal, Sunset Pumps, and Western Canal. Lengths of bars extending above the Inflow line represent amounts derived from storage.

Figure 12. Lake Oroville Operation



* Excludes pumpback.

Figure 13. Operation of Lake Oroville for Flood Control
1991-1992

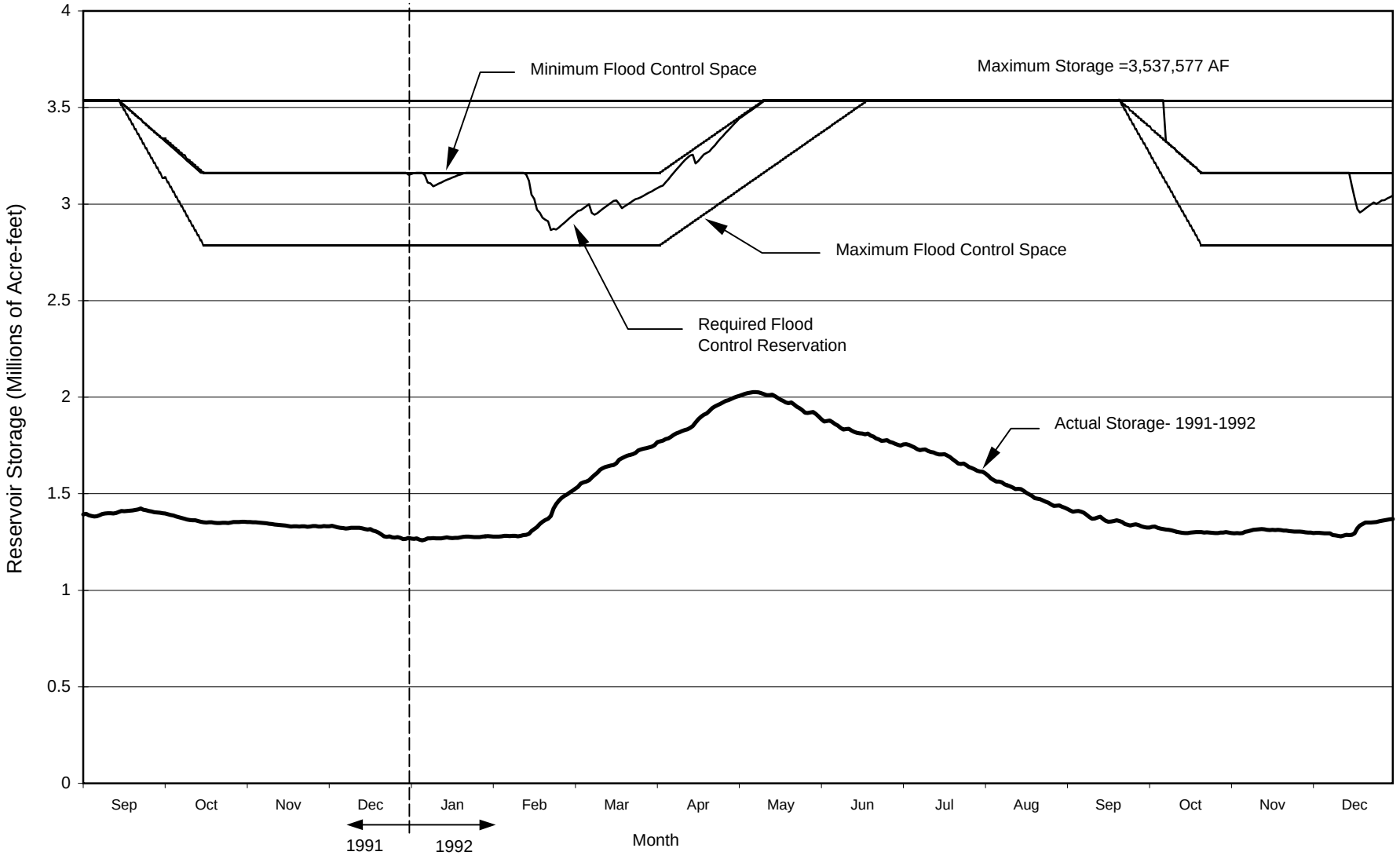
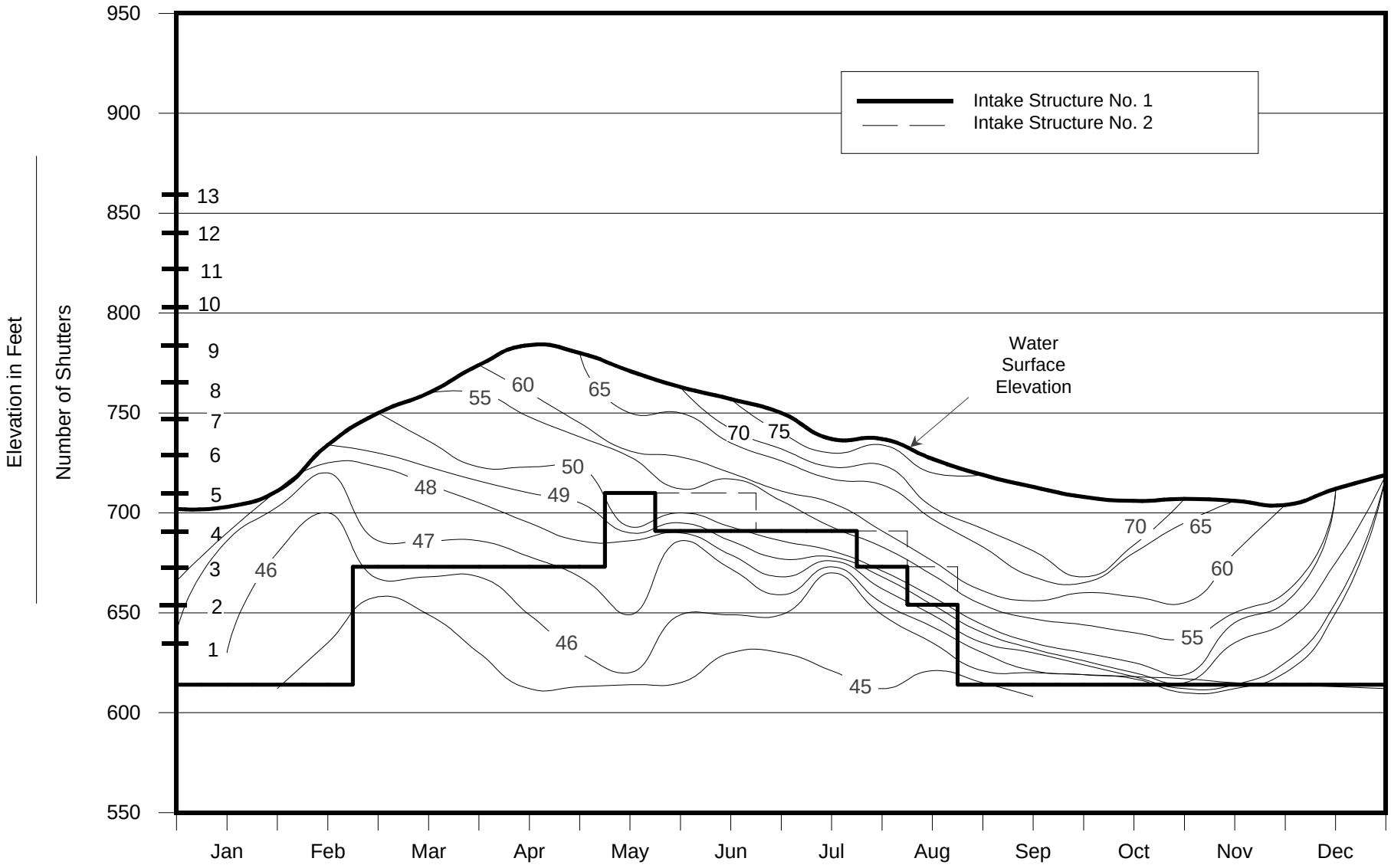
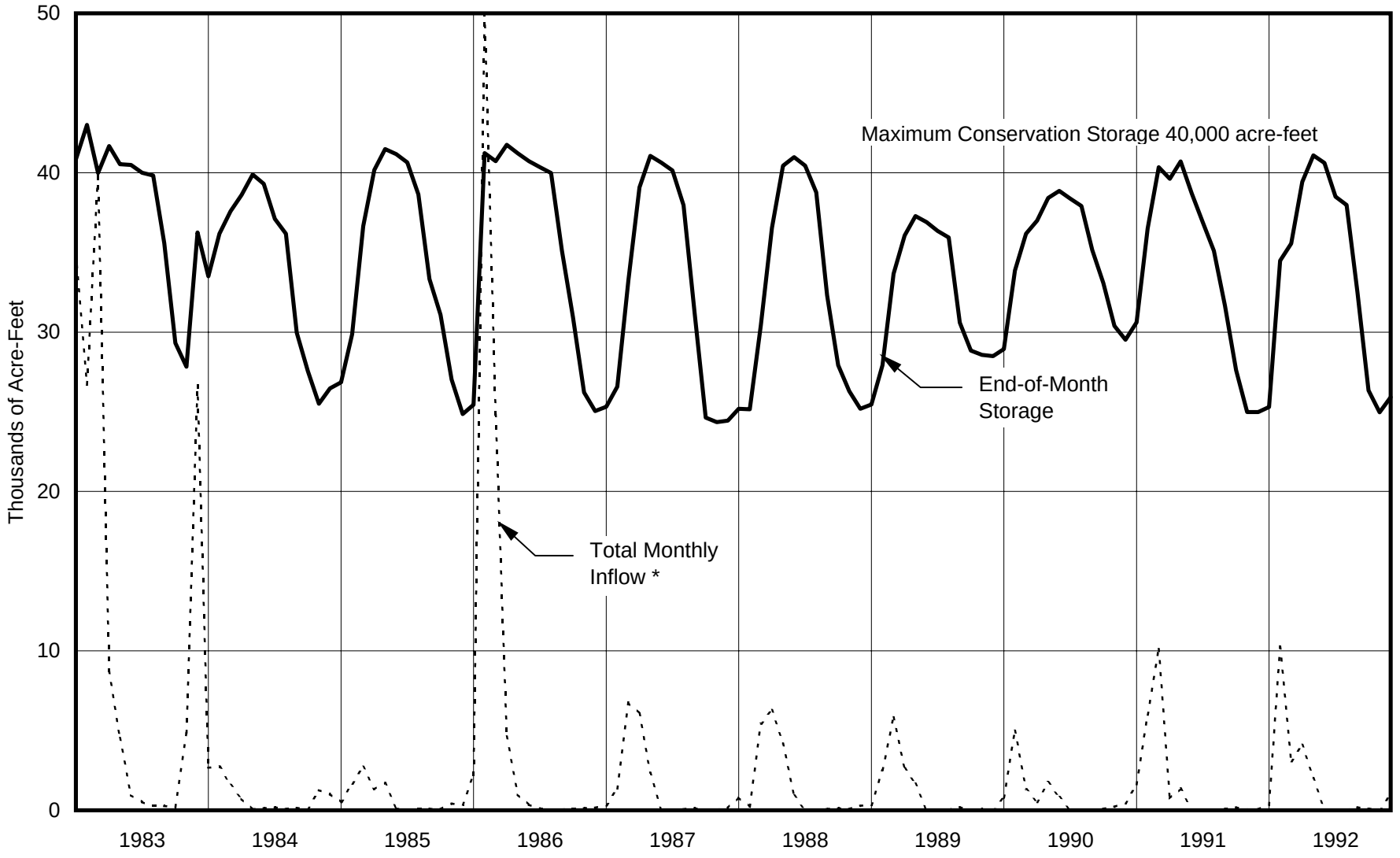


Figure 14. Lake Oroville Temperatures
1992
(isotherms in degrees Fahrenheit)



Note: Temperature data is taken once per month and averaged for the rest of the year.

Figure 15. Lake Del Valle Operation



* Natural and pumped inflows

Figure 16. San Luis Reservoir Operation

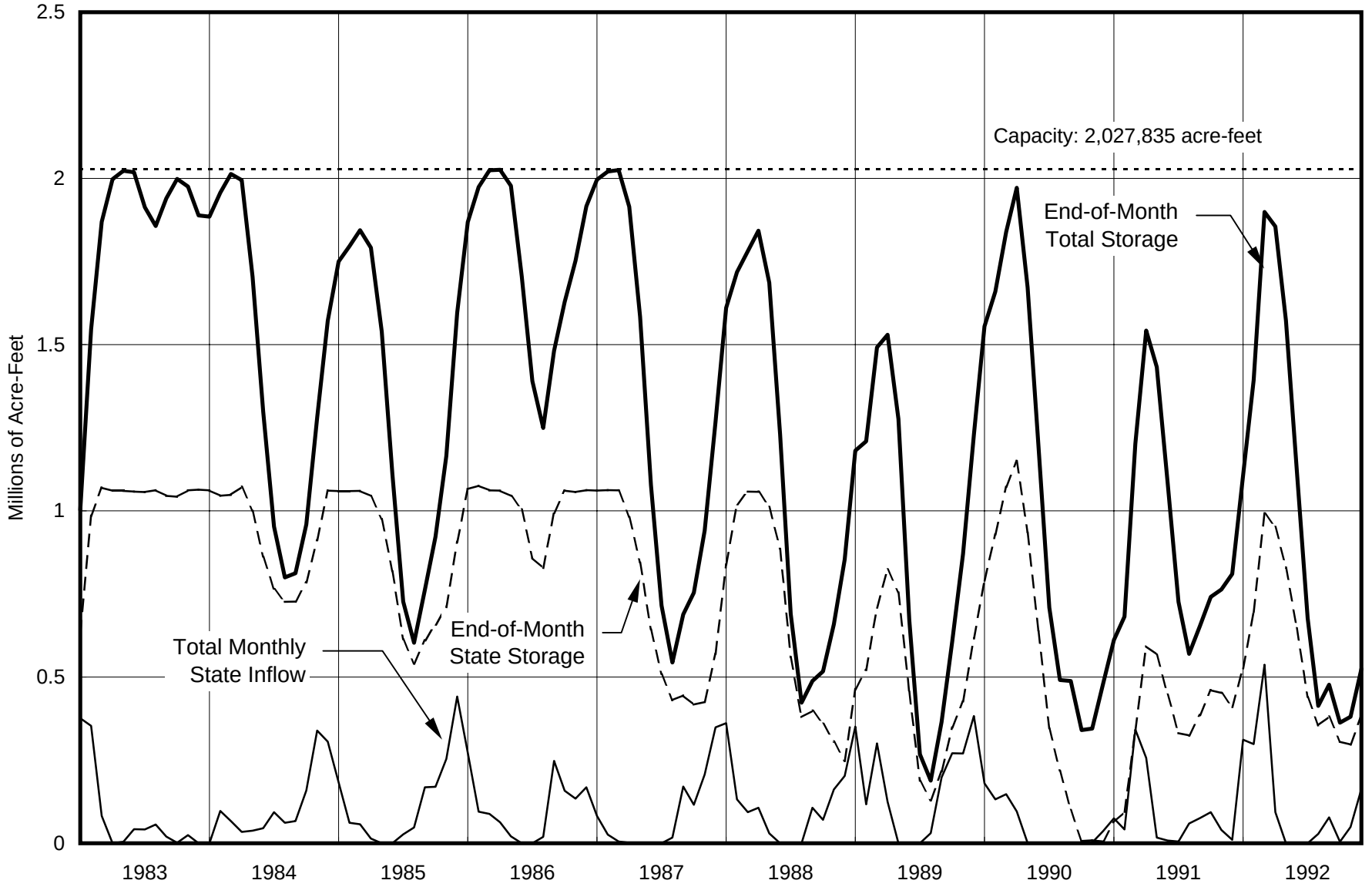
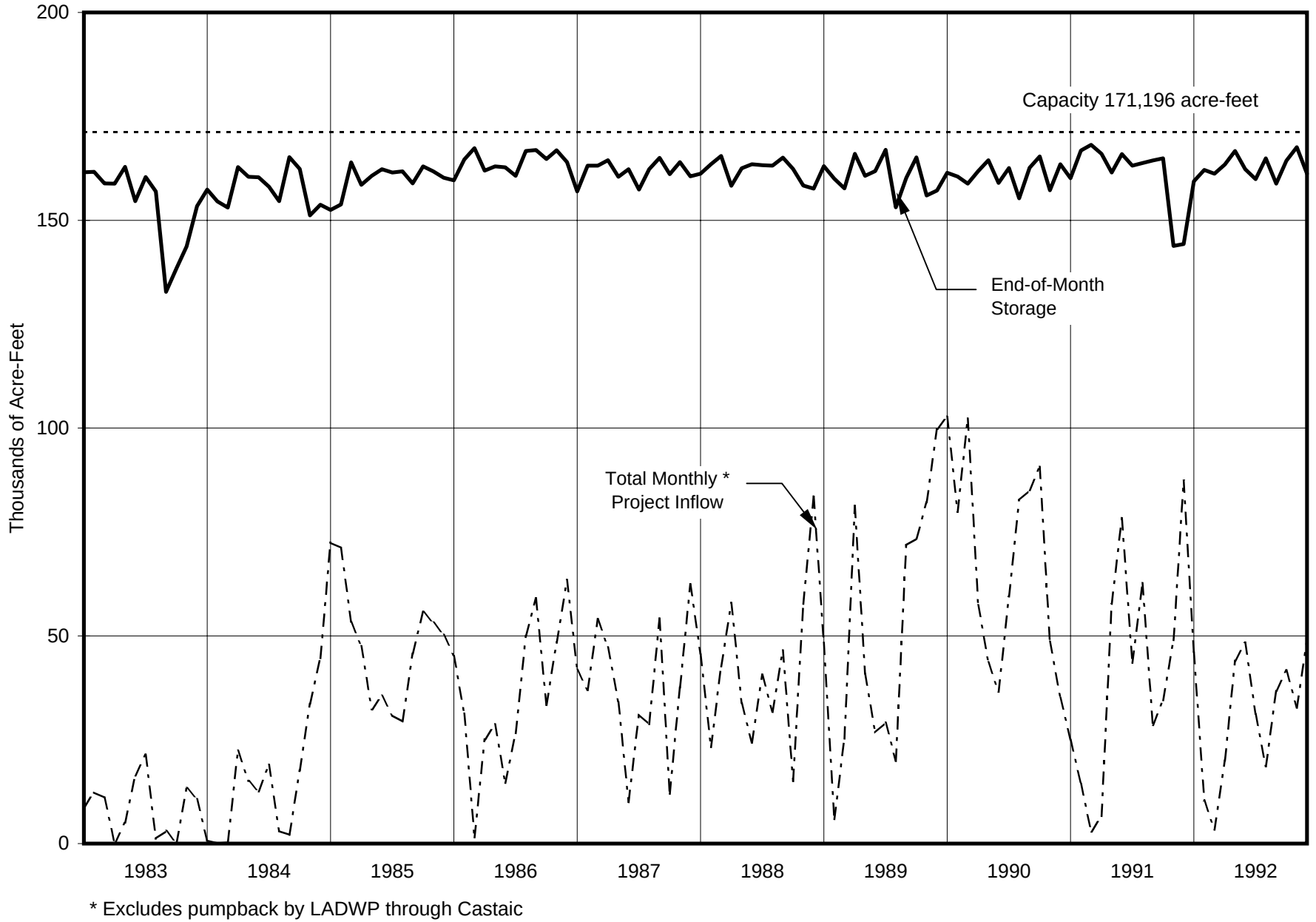


Figure 17. Pyramid Lake Operation



* Excludes pumpback by LADWP through Castaic

Figure 18. Castaic Lake Operation

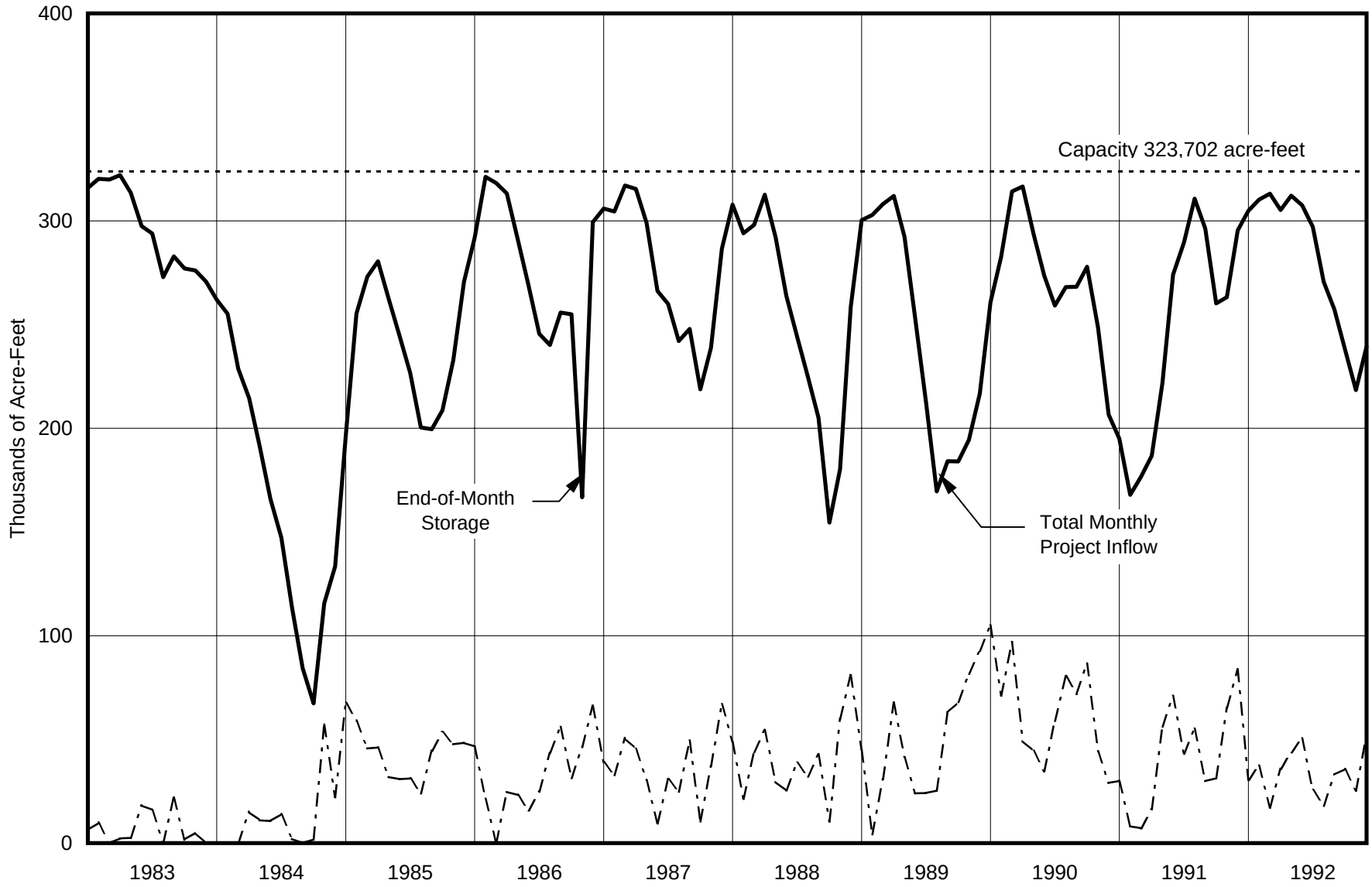


Figure 19. Silverwood Lake Operation

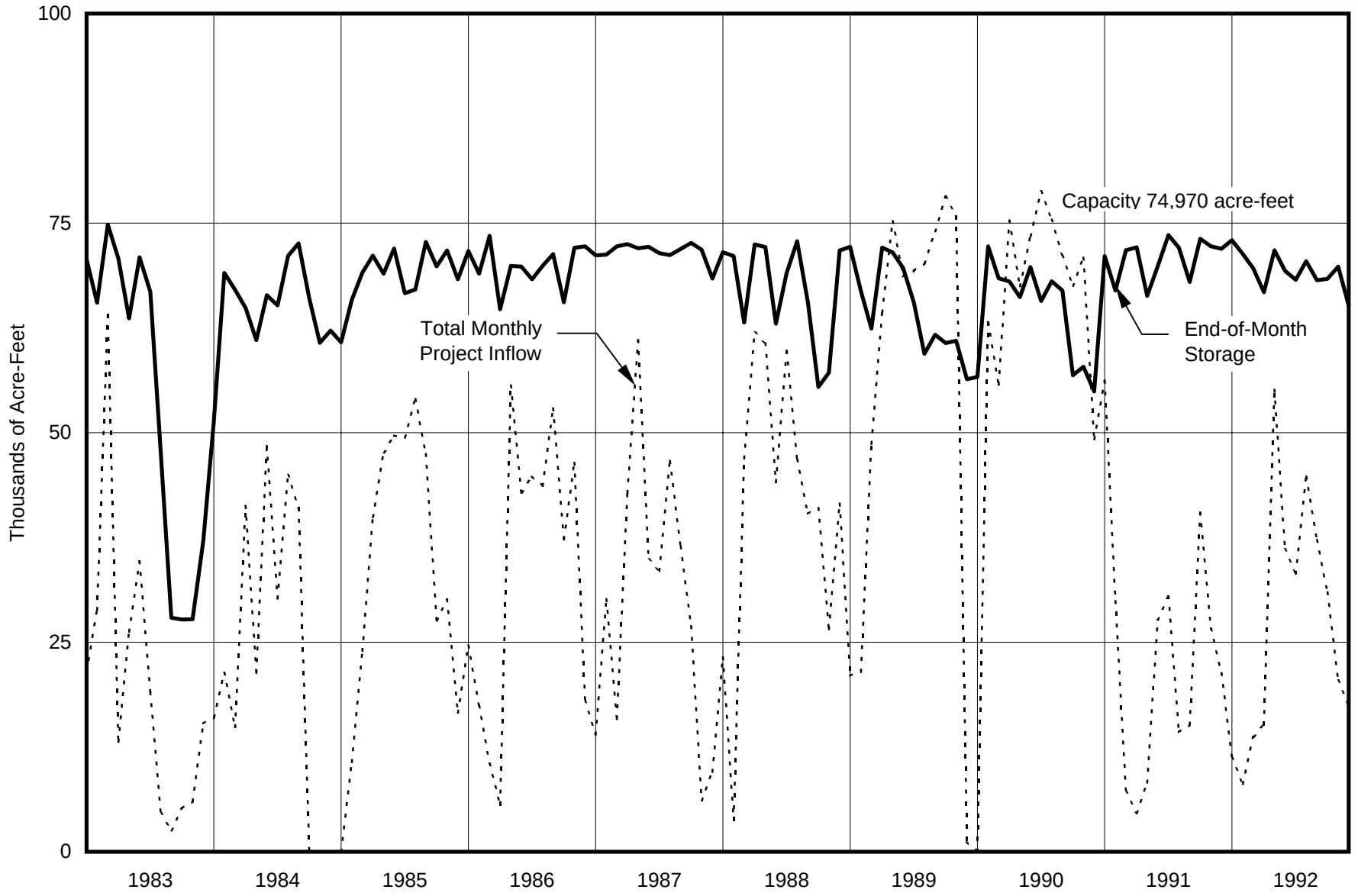
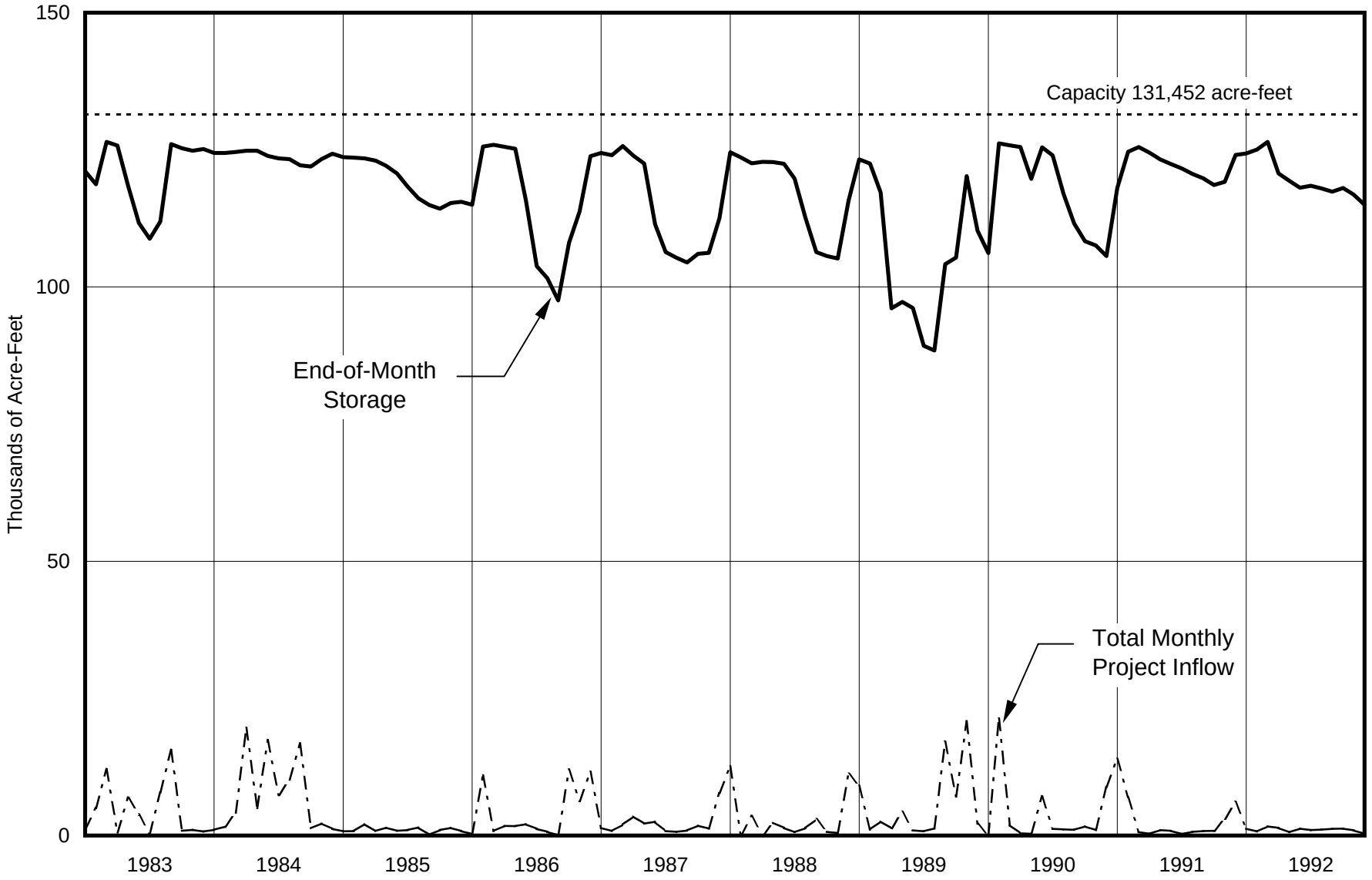
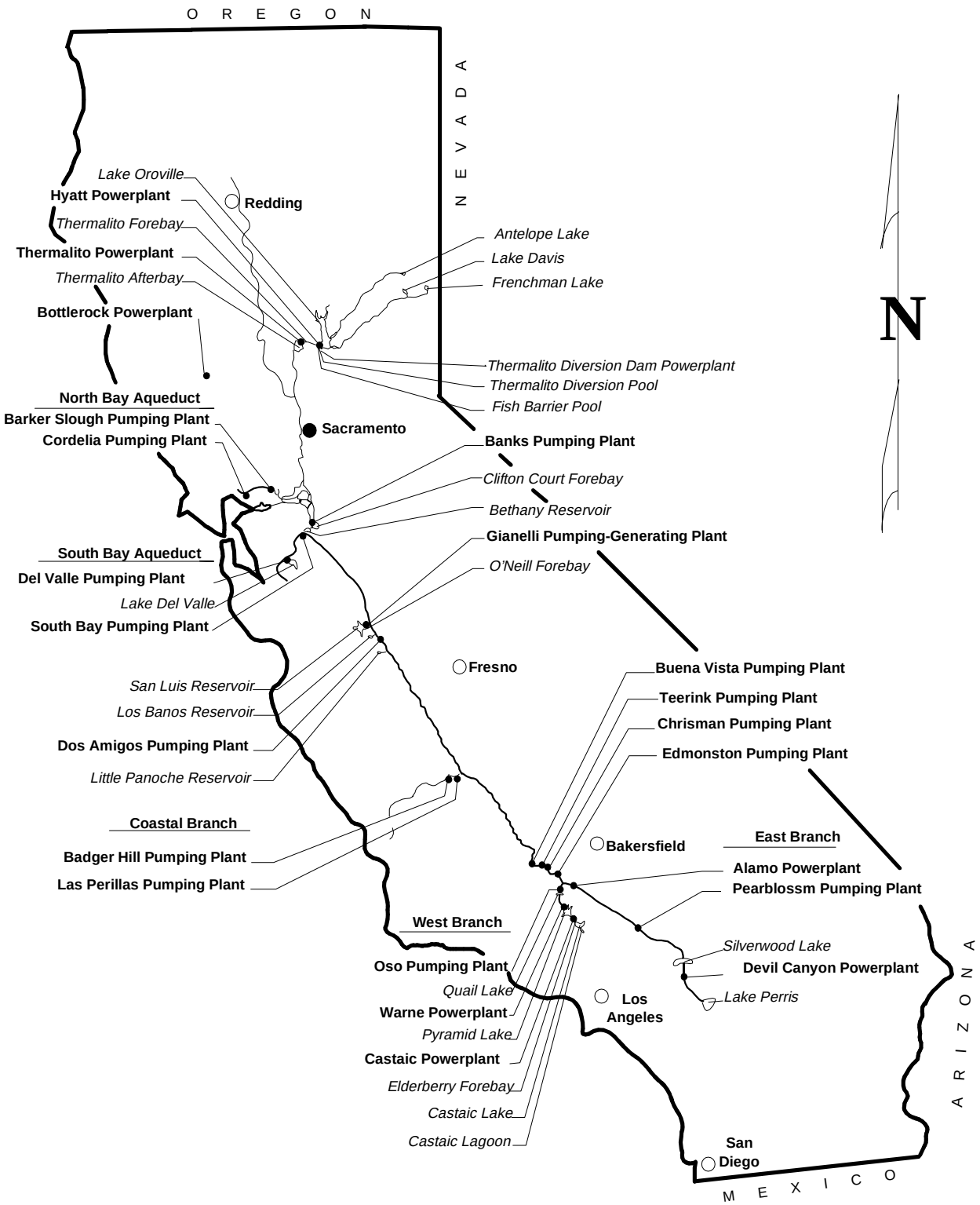


Figure 20. Lake Perris Operation

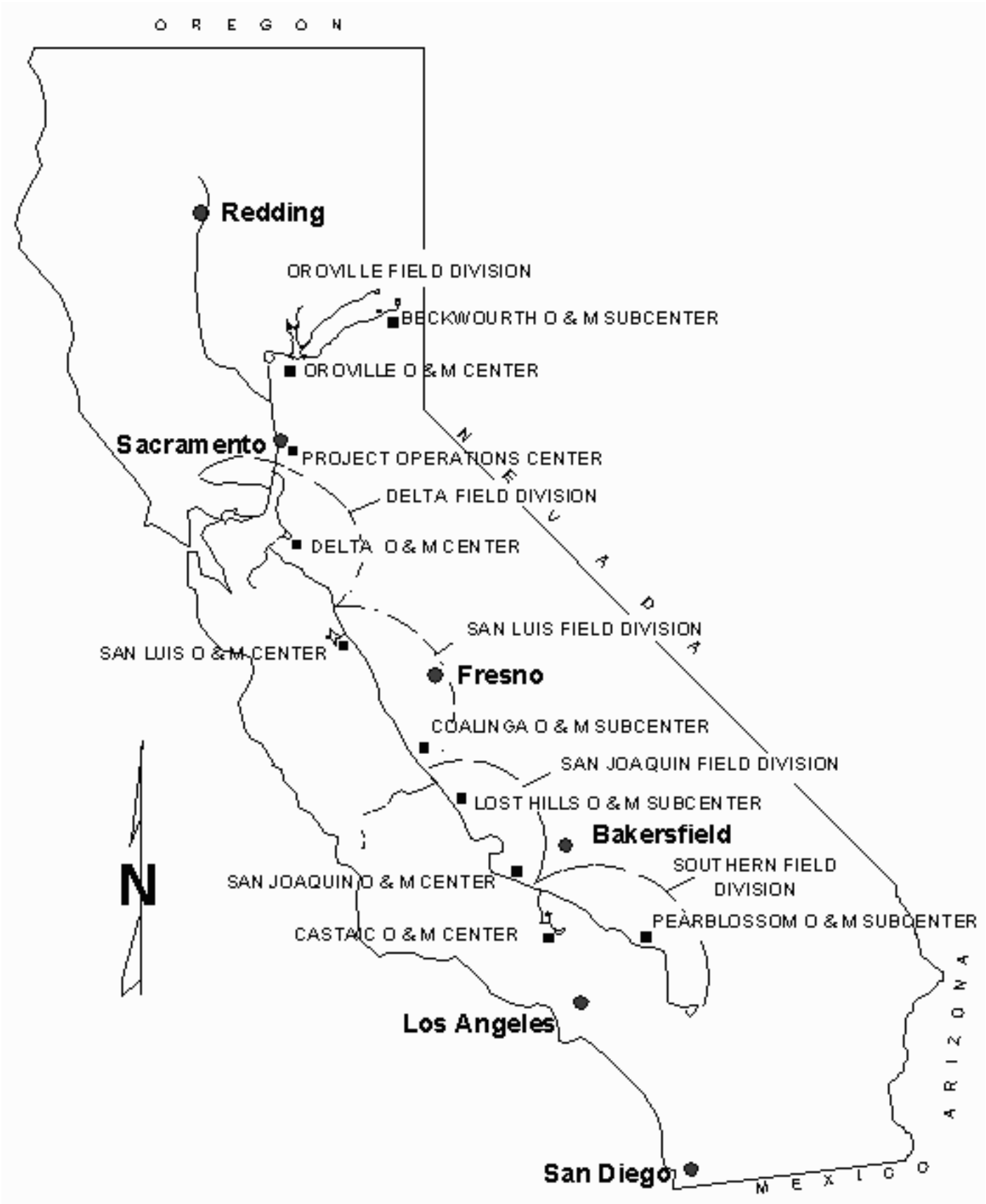


Map 1

Project Facilities



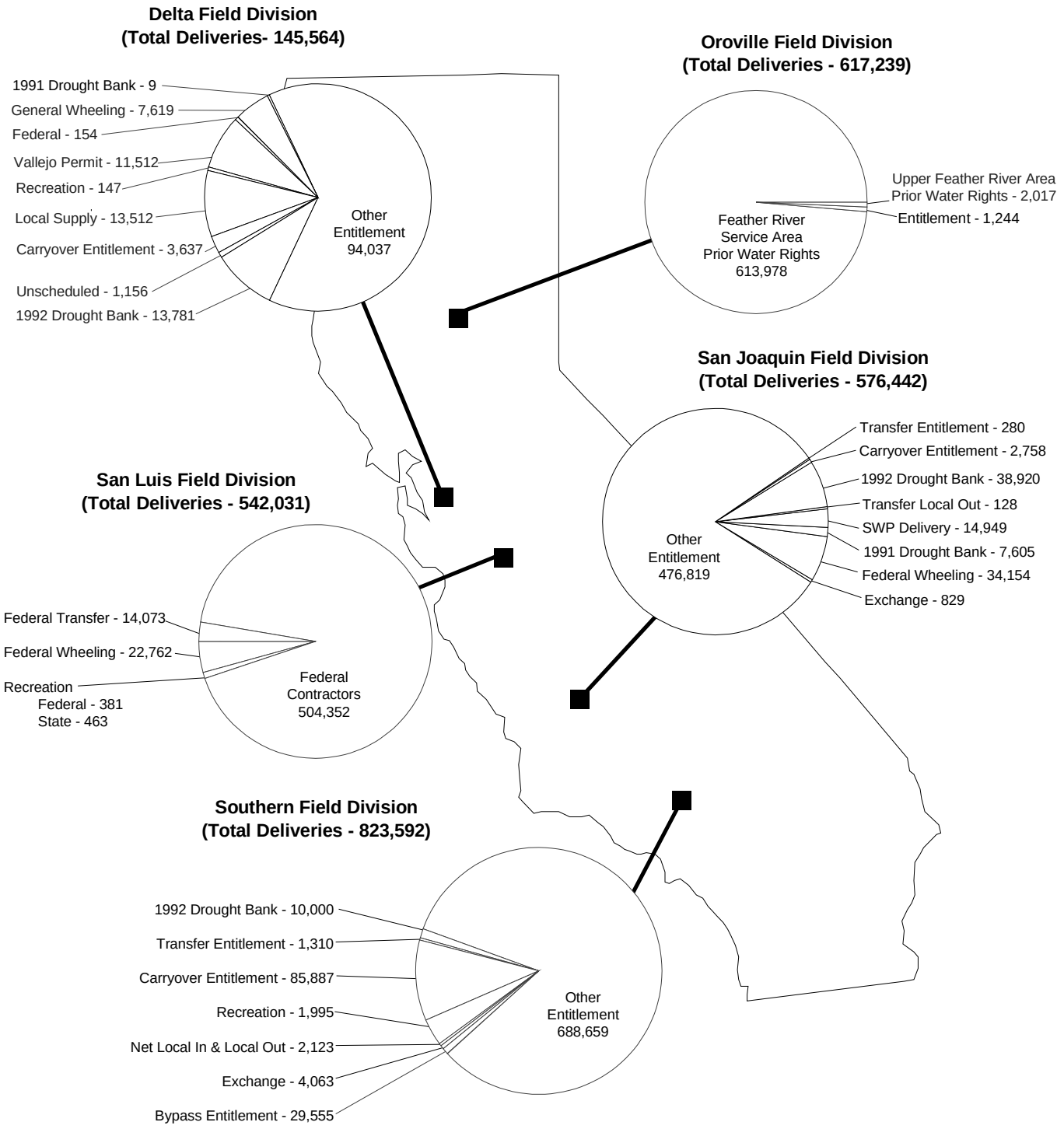
Map 2 Field Division Boundaries



Map 3

1992 Water Deliveries

(in acre-feet)



Total Deliveries
2,704,868

Table 22a. Summary of California Aqueduct Operation

1992

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
DELTA FIELD DIVISION													
Note: North Bay Aqueduct, South Bay Aqueduct, and Lake Del Valle are not within the Edmond G. Brown California Aqueduct, they are shown here for completeness.													
North Bay Aqueduct													
Pumped at Barker Slough Pumping Plant	2,695	2,234	2,726	3,370	4,556	3,429	2,598	2,733	2,621	2,493	2,063	1,718	33,236
Deliveries (Travis & Fairfield/Vacaville)	772	606	1,051	1,080	1,388	1,333	357	275	896	788	673	511	9,730
Pumped at Cordelia Pumping Plant	1,897	1,504	1,556	2,195	2,894	1,922	2,127	2,248	1,494	1,554	1,312	1,160	21,863
1/ Deliveries (Benecia, Vallejo, Am.Can. 1&2, & Napa)	1,895	1,505	1,554	2,199	2,894	1,922	2,129	2,247	1,497	1,551	1,314	1,159	21,866
Change in Storage, Napa Terminal Tank	2	-1	2	-4	0	0	-2	1	-3	3	-2	1	-3
Computed Losses (-), Gains (+)	-26	-124	-119	-95	-274	-174	-114	-210	-231	-151	-78	-47	-1,643
California Aqueduct													
Pumped at Banks Pumping Plant	185,310	202,896	385,962	70,757	43,021	56,138	23,107	91,119	164,785	42,666	66,769	170,130	1,502,660
Pumped at South Bay Pumping Plant	7,038	3,723	3,531	10,691	9,595	9,672	8,111	15,102	8,339	7,000	10,121	8,777	101,700
Delivered to Contracting Agencies	8	9	12	61	469	403	684	248	347	125	13	14	2,393
Inflow Into Aqueduct (Oak Flat Local-In)	9	119	0	0	0	0	0	0	0	0	0	0	128
Change in Storage	-323	849	-542	-14	136	-450	188	1,268	-1,112	573	218	-538	253
Outflow at Check 12	179,048	199,006	382,586	59,968	31,946	45,920	12,462	72,806	154,828	33,298	54,439	159,225	1,385,532
Computed Losses (-), Gains (+)	452	572	-375	-51	-875	-593	-1,662	-1,695	-2,383	-1,670	-1,978	-2,652	-12,910
South Bay Aqueduct													
Pumped at South Bay Pumping Plant	7,038	3,723	3,531	10,691	9,595	9,672	8,111	15,102	8,339	7,000	10,121	8,777	101,700
Lake Del Valle releases to South Bay Aqueduct	0	1,023	1,903	22	0	0	1,694	0	5,295	6,050	1,259	0	17,246
Outflow (Pumped into Lake Del Valle)	0	270	988	4,052	2,024	0	0	0	0	0	0	0	7,334
Outflow, Deliveries	7,028	4,466	4,400	6,641	7,561	9,662	9,781	15,088	13,624	13,040	11,370	8,767	111,428
Computed Losses (-), Gains (+)	-10	-10	-46	-20	-10	-10	-24	-14	-10	-10	-10	-10	-184
Lake Del Valle Operation:													
Natural inflow	337	10,006	2,088	64	-6	-101	22	-13	190	109	-7	994	13,683
Inflow from South Bay Aqueduct	0	270	988	4,052	2,024	0	0	0	0	0	0	0	7,334
Outflows to Arroyo Valle & S.B. Aqueduct	0	1,023	1,903	22	0	0	1,694	0	5,295	6,050	1,259	0	17,246
Delivered to EBRP District	6	6	6	9	11	26	26	22	24	1	8	2	147
End-of-Month Storage (State)	25,296	34,489	35,557	39,428	41,085	40,618	38,488	37,978	32,500	26,349	24,971	25,922	- - -
Change in Storage	301	9,193	1,068	3,871	1,657	-467	-2,130	-510	-5,478	-6,151	-1,378	951	927
Evaporation Losses	-30	-54	-99	-214	-350	-340	-432	-475	-349	-209	-104	-41	-2,697
SAN LUIS FIELD DIVISION													
O'Neill Forebay Operation													
End-of-Month Storage	47,861	52,250	48,995	52,357	41,323	52,142	47,940	42,145	47,598	45,368	43,204	49,474	- - -
Inflow, California Aqueduct	179,048	199,006	382,586	59,968	31,946	45,920	12,462	72,806	154,828	33,298	54,439	159,225	1,385,532
Inflow, O'Neill P.- G. Plant	185,466	112,902	187,194	60,914	0	0	0	1,688	32,578	2,793	38,805	69,634	691,974
Inflow, Gianelli P.- G. Plant	1,469	2,208	0	119,732	270,639	439,605	438,172	284,805	3,991	111,763	23,730	9,429	1,705,543
Delivered to Dept. of Fish and Game (State)	20	37	26	40	15	0	0	12	17	17	95	28	307
Delivered to Dept. of Fish and Game (Fed.)	17	30	21	32	13	0	0	10	13	14	79	23	252
2/ Delivered to Dept. of Parks & Rec. (Fed.)	1	0	1	9	7	10	9	7	6	7	1	1	59
2/ Delivered to Dept. of Parks & Rec. (State)	1	1	1	11	9	12	11	7	8	8	2	1	72
Delivered to Federal Customers	319	205	60	1,070	1,465	1,940	2,306	2,115	773	396	159	68	10,876
Outflow, O'Neill P.- G. Plant	0	1,439	0	27,820	68,824	111,751	124,260	88,471	1,437	48,848	4,515	790	478,155
Outflow, Gianelli P.- G. Plant	311,791	298,286	536,905	93,837	0	0	0	27,983	78,095	4,096	49,066	163,093	1,563,152
Outflow, Dos Amigos P.P.	56,678	16,150	54,767	118,115	244,401	376,394	345,713	260,323	112,400	104,815	68,415	68,944	1,827,115
Change in Storage	-499	4,389	-3,255	3,362	-11,034	10,819	-4,202	-5,795	5,453	-2,230	-2,164	6,270	1,114
Computed Losses (-), Gains (+)	2,343	6,420	18,744	3,662	1,099	15,379	17,443	13,820	6,791	8,102	3,191	928	97,922
San Luis Reservoir Operation													
State End-of-Month Storage	526,163	695,590	991,840	951,836	828,834	646,884	439,203	354,014	380,612	302,613	293,189	379,766	- - -
Total End-of-Month Storage	1,106,234	1,393,332	1,899,427	1,855,018	1,571,692	1,121,789	677,191	413,450	476,863	362,822	380,915	524,416	- - -
Inflow, Gianelli P.- G. Plant	311,791	298,286	536,905	93,837	0	0	0	27,983	78,095	4,096	49,066	163,093	1,563,152
Outflow, Gianelli P.- G. Plant	1,469	2,208	0	119,732	270,639	439,605	438,172	284,805	3,991	111,763	23,730	9,429	1,705,543
Pacheco Tunnel Diversion	4,039	2,748	8,425	15,616	11,925	11,040	10,808	7,269	5,864	5,583	2,095	4,880	90,292
Change in Storage (Total)	295,929	287,098	506,095	-44,409	-283,326	-449,903	-444,598	-263,741	63,413	-114,041	18,093	143,501	-285,889
Computed Losses (-), Gains (+)	-10,354	-6,232	-22,385	-2,898	-762	742	4,382	350	-4,827	-791	-5,148	-5,283	-53,206

1/ Includes 237 acre-feet of Vallejo Permit water transferred to Napa.

2/ Not included in calculation for loss & gain.

Table 22b. Summary of California Aqueduct Operation (cont.)
1992
(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SAN LUIS FIELD DIVISION (Cont.)													
California Aqueduct (Pools 14 thru 21)													
Inflow, Dos Amigos P.P.(State)	56,066	15,274	32,786	93,313	160,719	230,778	224,211	169,590	109,117	104,815	68,415	68,944	1,334,028
Inflow, Dos Amigos P.P.(Federal)	612	876	21,981	24,802	83,682	145,616	121,502	90,733	3,283	0	0	0	493,087
Total Inflow, Dos Amigos P.P.	56,678	16,150	54,767	118,115	244,401	376,394	345,713	260,323	112,400	104,815	68,415	68,944	1,827,115
Flow into Aqueduct	14,717	8,740	2,163	7,041	10,674	7,341	8,879	9,786	14,286	17,048	16,241	15,248	132,164
Delivered to Dept. of Fish and Game (State)	16	10	0	0	0	0	33	8	14	0	2	0	83
Delivered to Dept. of Fish and Game (Federal)	13	9	0	0	0	0	27	7	11	0	2	0	69
Delivered to Federal Customers	7,683	10,222	19,698	32,063	76,875	128,539	120,755	87,096	15,030	13,276	9,617	9,459	530,313
Outflow, Check 21 (State)	59,190	14,638	23,965	78,392	169,275	239,887	220,574	172,204	103,723	97,607	67,340	71,788	1,318,583
Outflow, Check 21 (Federal)	0	0	7,889	8,786	6,647	3,692	1,424	0	515	2,698	3,215	789	35,655
Change in Storage (includes evaporation)	-170	-1,652	1,566	-375	206	151	-1,802	1,479	-49	443	-495	880	182
Computed Losses (-), Gains (+)	-4,663	-1,663	-3,812	-6,290	-2,072	-11,466	-13,581	-9,315	-7,442	-7,839	-4,975	-1,276	-74,394
SAN JOAQUIN FIELD DIVISION													
California Aqueduct, Check 21 to Buena Vista Pumping Plant													
Inflow, Check 21 (state)	59,190	14,638	23,965	78,392	169,275	239,887	220,574	172,204	103,723	97,607	67,340	71,788	1,318,583
Inflow, Check 21 (Federal)	0	0	7,889	8,786	6,647	3,692	1,424	0	515	2,698	3,215	789	35,655
Total Inflow, Check 21	59,190	14,638	31,854	87,178	175,922	243,579	221,998	172,204	104,238	100,305	70,555	72,577	1,354,238
West Kern Trade, Pumpback	524	345	0	0	307	0	0	0	0	0	0	0	1,176
Delivered to Contracting State Agencies	2,438	2,849	5,003	16,408	25,285	95,358	102,067	67,722	7,098	5,571	5,796	3,413	339,008
Delivered to Federal Customers	0	0	7,889	8,786	6,647	2,863	1,424	0	515	2,026	3,215	789	34,154
Kern Water Bank Preconsolidation Return	4,442	3,423	55	1,243	2,060	0	639	75	1,480	0	1,242	1,082	15,741
Inflow, Hacienda Wells	0	25	504	0	0	98	2,784	2,937	1,422	646	1,396	2,881	12,693
Outflow, Buena Vista P.P.	59,644	14,276	13,496	49,739	123,073	118,285	93,821	92,048	90,422	87,656	60,575	67,295	870,330
Coastal Br. Diversion (Las PerillasP.P.)	20	439	4,157	8,793	17,643	18,990	18,284	10,593	7,075	5,173	506	242	91,915
Change in Storage	536	-92	703	35	-20	-503	350	-489	-284	-1,435	320	2,430	1,551
Computed Losses (-), Gains (+)	-1,518	-959	-1,165	-4,660	-5,661	-8,684	-9,475	-5,342	-2,314	-1,960	-2,781	-2,371	-46,890
California Aqueduct, Buena Vista P.P. to Teerink P.P.													
Inflow, Buena Vista P.P.	59,644	14,276	13,496	49,739	123,073	118,285	93,821	92,048	90,422	87,656	60,575	67,295	870,330
Delivered to Contracting State Agencies	1,047	1,189	3,378	8,672	13,047	16,634	17,278	15,109	3,772	2,666	654	598	84,044
W.R.M.W.S.D. Pumpback	386	611	1,094	995	187	9	218	455	284	515	298	1,096	6,148
Outflow, Teerink P.P.	59,687	14,233	10,712	42,037	111,175	102,792	77,819	78,129	86,301	84,837	60,097	68,297	796,116
Change in Storage	66	-192	23	150	113	-130	-71	74	72	93	20	3	221
Computed Losses (-), Gains (+)	770	343	-477	125	1,075	1,002	987	809	-561	-575	-102	507	3,903
California Aqueduct, Teerink P.P. to Chrisman P.P.													
Inflow, Teerink P.P.	59,687	14,233	10,712	42,037	111,175	102,792	77,819	78,129	86,301	84,837	60,097	68,297	796,116
Delivered to Contracting State Agencies	0	442	274	2,008	4,296	5,783	3,587	2,331	1,896	2,320	508	1,407	24,852
Outflow, Chrisman P.P.	58,799	13,276	10,279	39,693	106,719	97,323	74,331	76,380	84,937	83,462	60,476	68,246	773,921
Change in Storage	5	71	-45	8	0	-11	-32	40	14	6	20	-23	54
Computed Losses (-), Gains (+)	-883	-444	-204	-328	-160	303	67	622	546	951	907	1,333	2,711
California Aqueduct, Chrisman P.P. to Edmonston P.P.													
Inflow, Chrisman P.P.	58,799	13,276	10,279	39,693	106,719	97,323	74,331	76,380	84,937	83,462	60,476	68,246	773,921
Delivered to Contracting State Agencies	0	130	274	630	1,272	2,249	1,784	1,665	1,218	692	47	401	10,362
Outflow, Edmonston P.P.	58,411	13,168	9,850	38,574	104,791	93,899	72,073	73,193	82,650	81,417	58,678	65,499	752,203
Change in Storage	-26	-37	81	-41	-65	81	-24	37	-28	0	66	-25	19
Computed Losses (-), Gains (+)	-414	-15	-74	-530	-721	-1,094	-498	-1,485	-1,097	-1,353	-1,685	-2,371	-11,337
Coastal Branch, California Aqueduct													
Inflow, Las Perillas P.P.	20	439	4,157	8,793	17,643	18,990	18,284	10,593	7,075	5,173	506	242	91,915
B.M.W.S.D. Pumpback	0	0	0	0	0	0	0	0	0	0	0	0	0
Delivered to Contracting State Agencies	40	419	3,714	7,766	16,060	17,148	16,584	10,115	6,518	5,043	407	208	84,022
Delivered to Federal Customers	0	0	0	0	0	0	0	0	0	0	0	0	0
Change in Storage	-23	13	-5	-9	15	-18	3	19	-3	-63	45	-20	-46
Computed Losses (-), Gains (+)	-3	-7	-448	-1,036	-1,568	-1,860	-1,697	-459	-560	-193	-54	-54	-7,939

Table 22c. Summary of California Aqueduct Operation (cont.)

1992

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SOUTHERN FIELD DIVISION													
California Aqueduct, Edmonston P.P. to Junction of West Branch													
Inflow, Edmonston P.P.	58,411	13,168	9,850	38,574	104,791	93,899	72,073	73,193	82,650	81,417	58,678	65,499	752,203
Outflow, West Branch	45,858	10,666	1,025	20,646	44,374	48,088	30,900	19,480	37,076	41,640	32,632	48,078	380,463
Outflow, East Branch	12,546	2,507	8,837	17,920	60,410	45,801	41,158	53,718	45,591	39,782	26,040	17,420	371,730
Change in Storage	7	1	-11	-1	4	3	4	-3	-5	-4	5	9	9
Computed Losses (-), Gains (+)	0	6	1	-9	-3	-7	-11	2	12	1	-1	8	-1
California Aqueduct, Junction of West Branch to Pearblossom P.P.													
Inflow (Aqueduct)	12,546	2,507	1/ 8,853	17,920	60,410	45,801	41,158	53,718	45,591	39,782	26,040	17,420	371,746
Delivered to Contracting Agencies	240	861	1,353	2,161	3,771	4,699	5,759	6,165	4,720	3,294	2,244	946	36,213
Storage Balance Adjustment	-399	-162	0	0	0	0	0	0	0	0	0	0	-561
Outflow, Pearblossom P.P.	12,085	2,402	7,534	15,741	56,535	39,997	35,158	48,083	41,318	35,870	23,678	16,809	335,210
Change in Storage	583	-137	7	-631	-115	582	-606	-345	459	635	69	254	755
Computed Losses (-), Gains (+)	-37	457	41	-649	-219	-523	-847	185	906	17	-49	589	-129
California Aqueduct, Pearblossom P.P. to Silverwood Lake													
Inflow, Pearblossom P.P.	12,085	2,402	7,534	15,741	56,535	39,997	35,158	48,083	41,318	35,870	23,678	16,809	335,210
Deliveries (Exchange of Natural Inflow)	0	0	0	0	0	0	0	0	0	0	0	0	0
Exchange of Natural Inflow (Los Flores T.O.)	498	851	1,114	1,035	887	283	181	317	104	0	29	107	5,406
Outflow to Silverwood Lake	10,590	1,780	5,390	13,110	54,430	35,910	33,060	44,740	37,160	30,910	20,410	15,090	302,580
Change in Storage	82	-310	350	168	-240	232	-396	80	-5	62	226	131	380
Computed Losses (-), Gains (+)	-915	-81	-680	-1,428	-1,458	-3,572	-2,313	-2,946	-4,059	-4,898	-3,013	-1,481	-26,844
Silverwood Lake Operation													
Inflow, Project	10,590	1,780	5,390	13,110	54,430	35,910	33,060	44,740	37,160	30,910	20,410	15,090	302,580
Inflow, Natural	688	6,281	8,325	2,034	668	229	90	2	26	29	50	2,310	20,732
Delivered to Contracting Agencies	2,044	0	0	0	2,750	647	0	0	0	634	2,995	528	9,598
Recreation Deliveries	1	1	2	2	4	6	8	9	8	6	3	2	52
Outflow, Natural Inflow Released	173	3,528	6,353	1,682	12	18	16	15	15	15	15	1,130	12,972
Houston Creek Appropriation	76	82	91	52	126	121	125	147	134	128	81	110	1,273
Outflow, Project Water at San Bernardino Tunnel	9,547	7,329	9,389	16,636	48,333	40,531	34,642	44,302	42,202	34,298	18,405	23,184	328,798
Change in storage	1,015	-1,624	-1,718	-2,864	5,000	-2,445	-1,071	2,227	-2,273	158	1,465	-4,681	-6,811
Computed Losses (-), Gains (+)	1,578	1,255	402	364	1,127	2,739	570	1,958	2,900	4,300	2,504	2,873	22,570
California Aqueduct, Silverwood Lake to Lake Perris													
Inflow, San Bernardino Tunnel	9,547	7,329	9,389	16,636	48,333	40,531	34,642	44,302	42,202	34,298	18,405	23,184	328,798
Inflow, SBVMWD Pump-in at DC Afterbay	0	0	149	423	904	366	0	0	0	0	0	0	1,842
Delivered to Contracting Agencies	8,287	6,600	7,861	15,829	48,659	39,667	33,638	43,210	40,969	32,895	17,441	22,846	317,902
Outflow to Lake Perris	1,255	728	1,660	1,232	575	1,237	1,001	1,080	1,233	1,403	2/ 963	329	12,696
Change in Storage	4	0	16	-4	1	-10	0	9	-2	-2	0	8	20
Operational Losses (-), Gains (+)	-1	-1	-1	-2	-2	-3	-3	-3	-2	-2	-1	-1	-22
Lake Perris Operation													
Inflow	1,255	728	1,660	1,232	575	1,237	1,001	1,080	1,233	1,403	963	329	12,696
Delivered to Contracting Agencies	400	383	407	4,682	985	368	532	412	368	380	747	2,559	12,223
Recreation Deliveries	16	7	3	3	40	53	61	49	58	43	21	17	371
Outflow	0	0	0	0	0	0	0	0	0	0	0	0	0
Change in Storage	296	707	1,371	-5,742	-1,324	-1,274	335	-469	-601	690	-1,202	-1,838	-9,051
Computed Losses (-), Gains (+)	-543	369	121	-2,289	-874	-2,090	-73	-1,088	-1,408	-290	-1,397	409	-9,153

1/ Includes 16 acre-feet of LADWP inflow.

2/ Includes metering error of 38 AF.

Table 22d. Summary of California Aqueduct Operation (cont.)

1992

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SOUTHERN FIELD DIVISION (Cont.)													
West Branch California Aqueduct													
Tehachapi Afterbay to Oso P.P.													
Inflow	45,858	10,666	1,025	20,646	44,374	48,088	30,900	19,480	37,076	41,640	32,632	48,078	380,463
Outflow, Oso Pumping Plant	45,837	10,680	1,061	20,619	44,353	48,059	30,854	19,495	37,129	41,652	32,613	48,073	380,425
Change in Storage	20	3	-34	-2	12	8	11	-8	-16	-12	15	29	26
Computed Losses (-), Gains (+)	-1	17	2	-29	-9	-21	-35	7	37	0	-4	24	-12
West Branch California Aqueduct													
Oso P.P. to Pyramid Lake													
Inflow, Oso P.P.	45,837	10,680	1,061	20,619	44,353	48,059	30,854	19,495	37,129	41,652	32,613	48,073	380,425
Outflow through Warne P.P.													
to Pyramid Lake	46,088	10,439	3,343	19,919	43,962	48,301	31,181	18,572	36,708	41,690	32,720	48,940	381,863
Change in Storage	81	659	-1,973	659	389	-243	-397	824	-269	-115	133	-600	-852
Operational Losses (-), Gains (+)	332	418	309	-41	-2	-1	-70	-99	-690	-77	240	267	586
Pyramid Lake Operation													
Inflow, Project	46,088	10,439	3,343	19,919	43,962	48,301	31,181	18,572	36,708	41,690	32,720	48,940	381,863
Inflow, Natural	1,393	35,224	20,889	11,604	4,907	1,684	1,091	611	616	607	730	2,446	81,802
Inflow, Pumpback from Elderberry Forebay	105,751	40,601	50,600	50,119	18,434	30,527	61,452	69,631	34,812	58,927	59,000	55,725	635,579
Deliveries (Fish Enhancement)	0	0	0	0	0	0	0	0	0	0	0	0	0
Deliveries	0	0	0	0	0	0	0	0	0	0	0	0	0
Delivered to Dept. of Parks and Rec. (State)	0	0	1	2	3	5	5	7	2	2	1	1	29
Outflow, Pyramid Diversion	1,503	28,245	14,855	330	844	1,180	1,570	1,565	1,513	2,797	4,988	2,259	61,649
Outflow, Angeles Tunnel	135,744	58,505	62,700	78,584	61,943	81,065	92,384	81,111	75,245	90,782	82,445	109,871	1,010,379
Change in Storage	15,076	2,738	-912	2,243	3,255	-4,398	-2,381	4,975	-6,089	5,533	3,279	-6,379	16,940
Computed Losses (-), Gains (+)	-909	3,224	1,812	-483	-1,258	-2,660	-2,146	-1,156	-1,465	-2,110	-1,737	-1,359	-10,247
Elderberry Forebay Operation													
Inflow, Project through Castaic P-G Plant	135,744	58,505	62,700	78,584	61,943	81,065	92,384	81,111	75,245	90,782	82,445	109,871	1,010,379
Inflow, Natural	233	12,741	3,989	2,449	497	103	8	0	0	0	1	297	20,318
Outflow, Pumpback to Pyramid Lake	105,751	40,601	50,600	50,119	18,434	30,527	61,452	69,631	34,812	58,927	59,000	55,725	635,579
Outflow, Project Water Released to													
Castaic Lake	30,229	31,554	14,710	34,537	43,423	50,407	25,534	17,880	32,992	35,649	25,210	51,504	393,629
Change in Storage	-107	-360	2,622	-5,140	80	443	4,281	-7,104	6,350	-4,836	-2,162	2,840	-3,093
Computed Losses (-), Gains (+)	-104	549	1,243	-1,517	-503	209	-1,125	-704	-1,091	-1,042	-398	-99	-4,582
Castaic Lake Operation													
Inflow, Project	30,229	31,554	14,710	34,537	43,423	50,407	25,534	17,880	32,992	35,649	25,210	51,504	393,629
Inflow, Natural	162	5,853	2,366	1,252	379	146	54	7	6	33	28	608	10,894
Delivered to Contracting Agencies	21,061	21,907	13,272	39,146	34,925	54,581	37,485	43,788	47,525	57,023	43,683	31,899	446,295
Outflow, Castaic Lagoon	406	12,672	952	3,224	887	329	304	95	382	0	0	194	19,445
Change in Storage	9,364	5,422	2,863	-7,940	7,021	-4,749	-10,369	-26,548	-13,175	-19,307	-19,662	21,054	-56,026
Computed Losses (-), Gains (+)	440	2,594	11	-1,359	-969	-392	1,832	-552	1,734	2,034	-1,217	1,035	5,191
Castaic Lagoon Operation													
Inflow (Includes recreation inflow)	406	12,672	952	3,224	887	329	304	95	382	0	0	1/ 240	19,491
Inflow, Natural	0	0	0	0	0	0	0	0	0	0	0	0	0
Outflow	187	12,174	766	3,232	853	307	210	137	195	129	135	0	18,325
Deliveries to Recreation (State)	27	23	29	16	81	120	121	149	129	98	96	20	909
Change in Storage	192	475	157	-24	-47	-98	-27	-191	58	-227	-231	220	257
Computed Losses (-), Gains (+)	0	0	0	0	0	0	0	0	0	0	0	0	0

1/ Includes 46 AF inflow from Lagoon tributaries.

Glossary

accretion - the water accumulated and retained within a service area.

***acre-foot (AF*)** - a quantity or volume of water covering one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons.

active storage capacity - the total usable reservoir capacity available for seasonal or cyclic water storage. It is gross reservoir capacity minus inactive storage capacity.

afterbay - a reservoir that regulates fluctuating discharges from a hydroelectric power plant or a pumping plant.

alluvium - a stratified bed of sand, gravel, silt, and clay deposited by flowing water.

aquifer - a geologic formation that stores and transmits water and yields significant quantities of water to wells and springs.

average annual runoff - the average value of annual runoff amounts for a specified area calculated for a selected period of record that represents average hydrologic conditions.

balanced water conditions - exist when upstream reservoir storage releases, plus other inflows, approximately equal the water supply needed to (1) satisfy Sacramento Valley and Sacramento-San Joaquin Delta in-basin needs, including Delta water quality requirements; and (2) meet export needs.

benthic invertebrates - aquatic animals without backbones that dwell on or in the bottom sediments of fresh or salt water. Examples: clams, crayfish, and a wide variety of worms.

biota - all living organisms of a region, as in a stream or other body of water.

brackish water - water containing dissolved minerals in amounts that exceed normally acceptable standards for municipal, domestic, and irrigation uses. Considerably less saline than sea water.

carriage water - the amount of water needed above an increased export so as to not increase salinity in the Delta.

conjunctive use - the operation of a ground water basin in combination with a surface water storage and conveyance system. Water is stored in the ground water basin for later use by intentionally recharging the basin during years of above-average water supply.

Decision 1485 (D-1485) operating criteria - standards for operating water project facilities under Water Rights Decision 1485 regarding the Sacramento-San Joaquin Delta and Suisun Marsh, adopted by the State Water Resources Control Board, August 1978.

Delta consumptive use - the sum of evapotranspiration and changes in soil moisture of Delta lands and evaporation from Delta channels.

Delta outflow index (DOI) -a calculated approximation of this seaward freshwater outflow as it passes Chipps Island near Pittsburg, beyond the confluence of the Sacramento and San Joaquin Rivers.

depletion - the water consumed within a service area and no longer available as a source of supply.

deviation - the difference between scheduled and actual energy.

dissolved organic compounds - carbon substances dissolved in water.

drainage basin - the area of land from which water drains into a river; for example, the Sacramento River Basin, in which all land area drains into the Sacramento River. Also called, "catchment area," "watershed," or "river basin."

drought condition - hydrologic conditions during a defined drought period during which rainfall and runoff are much less than average.

ecology - the study of the interrelationships of living organisms to one another and to their surroundings.

ecosystem - recognizable, relatively homogeneous units, including the organisms they contain, their environment, and all the interactions among them.

effluent - wastewater or other liquid, partially or completely treated or in its natural state, flowing from a treatment plant.

environment - the sum of all external influences and conditions affecting the life and development of an organism or ecological community; the total social and cultural conditions.

estuary - the lower course of a river entering the sea influenced by tidal action where the tide meets the river current.

evapotranspiration (ET) - the quantity of water transpired (given off), retained in plant tissues, and evaporated from plant tissues and surrounding soil surfaces. Quantitatively, it is usually expressed in terms of depth of water per unit area during a specified period of time.

evapotranspiration of applied water (ETAW) - the portion of the total evapotranspiration which is provided by irrigation.

forebay - a reservoir or pond situated at the intake of a pumping plant or power plant to stabilize water levels; also a storage basin for regulating water for percolation into groundwater basins.

fry - a recently hatched fish.

gross reservoir capacity - the total storage capacity available in a reservoir for all purposes, from the streambed to the normal maximum operating level. Includes dead (or inactive) storage, but excludes surcharge (water temporarily stored above the elevation of the top of the spillway).

groundwater - water that occurs beneath the land surface and completely fills all pore spaces of the alluvium, soil, or rock formation in which it is situated.

groundwater basin - a groundwater reservoir, defined by an overlying land surface and the underlying aquifers that contain water stored in the reservoir.

groundwater overdraft - the condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average.

groundwater recharge - increases in groundwater storage by natural conditions or by human activity.

groundwater table - the upper surface of the zone of saturation, except where the surface is formed by an impermeable body.

hydraulic barrier - a barrier developed in the estuary by release of fresh water from upstream reservoirs to prevent intrusion of sea water into the body of fresh water.

hydrologic balance - an accounting of all water inflow to, water outflow from, and changes in water storage within a hydrologic unit over a specified period of time.

hydrologic basin - the complete drainage area upstream from a given point on a stream.

hydrologic region - a study area, consisting of one or more planning subareas.

joint-use facilities - specific pumping plants, power plants, canals, and reservoirs in which both State and federal agencies participated in the construction, use, and maintenance.

land subsidence - the lowering of the natural land surface in response to earth movements; lowering of fluid pressure (or lowering of groundwater level); removal of underlying supporting materials by mining or solution of solids, either artificially or from natural causes; compaction caused by wetting (hydrocompaction); oxidation of organic matter in soils; or added load on the land surface.

megawatt (MW) - one million watts.

milligrams per liter (mg/L) - the weight in milligrams of any substance dissolved in one liter of liquid; nearly the same as parts per million.

natural flow - the flow past a specified point on a natural stream that is unaffected by stream diversion, storage, import, export, return flow, or change in use caused by modification in land use.

percolation - the downward movement of water throughout the soil or alluvium to a groundwater table.

permeability - the capability of soil or other geologic formations to transmit water.

phytoplankton - minute plants, usually algae, that live suspended in bodies of water and that drift about because they cannot move by themselves or because they are too small or too weak to swim effectively against a current.

pollution (of water) - the alteration of the physical, chemical, or biological properties of water by the introduction of any substance that adversely affects any beneficial use of water.

prior water right - a water designation used for water delivered based on its use prior to SWP construction.

pumping-generating plant (P.-G.)- a plant at which the turbine-driven generators can also be used as motor-driven pumps.

recharge basin - a surface facility, often a large pond, used to increase the percolation of surface water into a groundwater basin.

riparian vegetation - vegetation growing on the banks of a stream or other body of water.

runoff - the total volume of surface flow from an area during a specified time.

Sacramento River index - the sum of the Sacramento Valley's unimpaired runoff at the following four locations: Sacramento River near Red Bluff; total Feather River inflow to Lake Oroville; Yuba River at Smartville; and total American River inflow to Folsom Lake.

salinity - generally, the concentration of mineral salts dissolved in water. Salinity may be measured by weight (total dissolved solids), electrical conductivity, or osmotic pressure. See ***total dissolved solids*** .

salinity intrusion - the movement of salt water into a body of fresh water. It can occur in either surface water or groundwater bodies.

salt-water barrier - a physical facility or method of operation designed to prevent the intrusion of salt water into a body of fresh water.

sediment - soil or mineral material transported by water and deposited in streams or other bodies of water.

seepage - the gradual movement of a fluid into, through, or from a porous medium.

service area - the geographical land area served by a distribution system of a water agency.

smolt - a young salmon at the stage at which it migrates from fresh water to the sea.

snow water content - a calculated or measured amount of water contained in packed snow based on its depth and density.

spawning - the depositing and fertilizing of eggs (roe) by fish and other aquatic life.

streamflow - the rate of water flow past a specified point in a channel.

surplus water - developed water supplies in excess of contract entitlement or apportioned water.

total dissolved solids (TDS) - a quantitative measure of the residual minerals dissolved in water that remain after evaporation of a solution. Usually expressed in milligrams per liter. See ***salinity***.

transpiration - an essential physiological process in which plant tissues give off water vapor to the atmosphere.

unimpaired runoff - represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds.

wastewater - the water, liquid waste, or drainage from a community, industry, or institution.

water conservation - reduction in applied water due to more efficient water use.

water quality - used to describe the chemical, physical, and biological characteristics of water, usually in regard to its suitability for a particular purpose or use.

water right - a legally protected right to take possession of water occurring in a natural waterway and to divert that water for beneficial use.

water table - see ***groundwater table***.

water year - a continuous 12-month period for which hydrologic records are compiled and summarized. In California, it begins on October 1 and ends September 30 of the following year.

watershed - see ***drainage basin***.